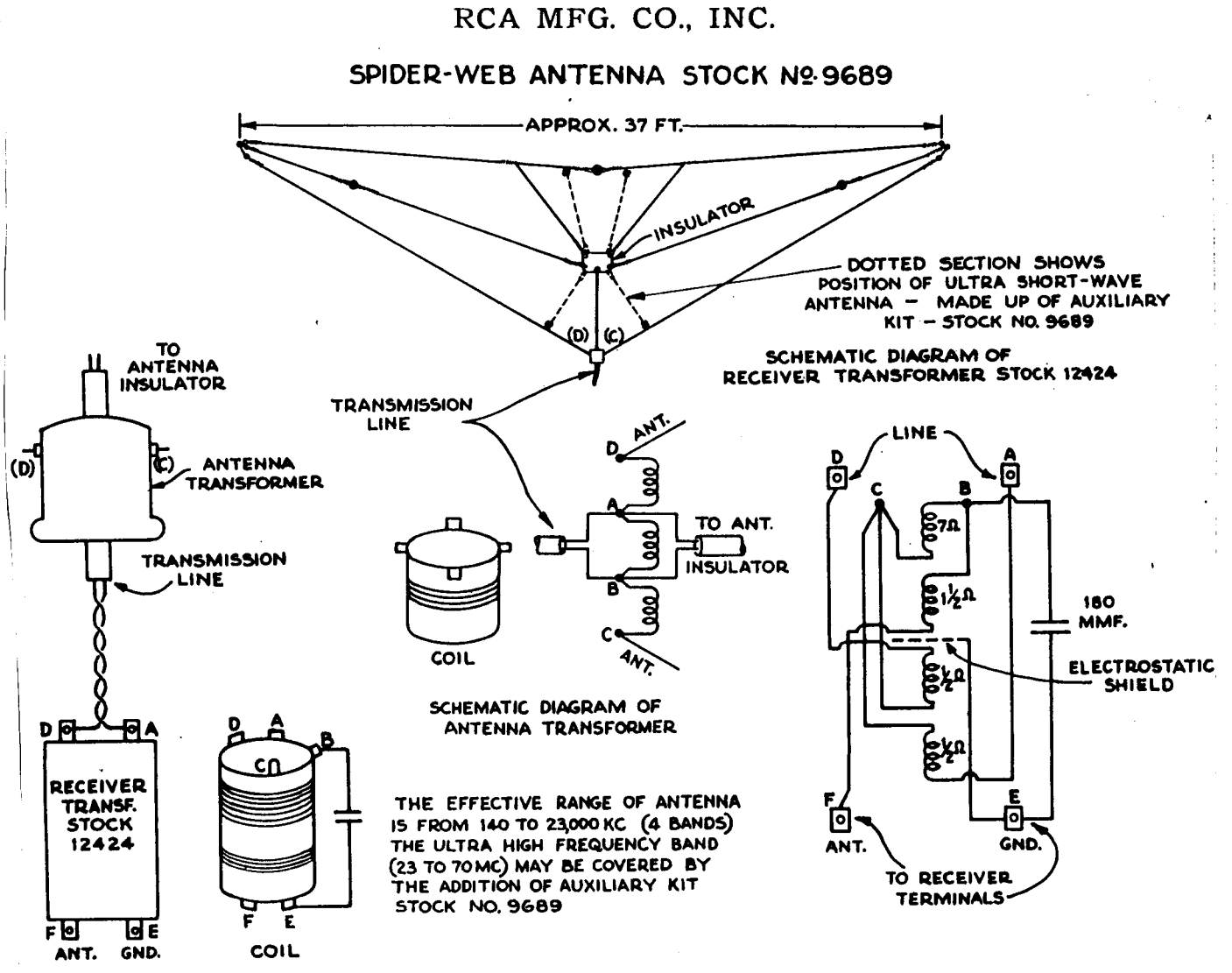
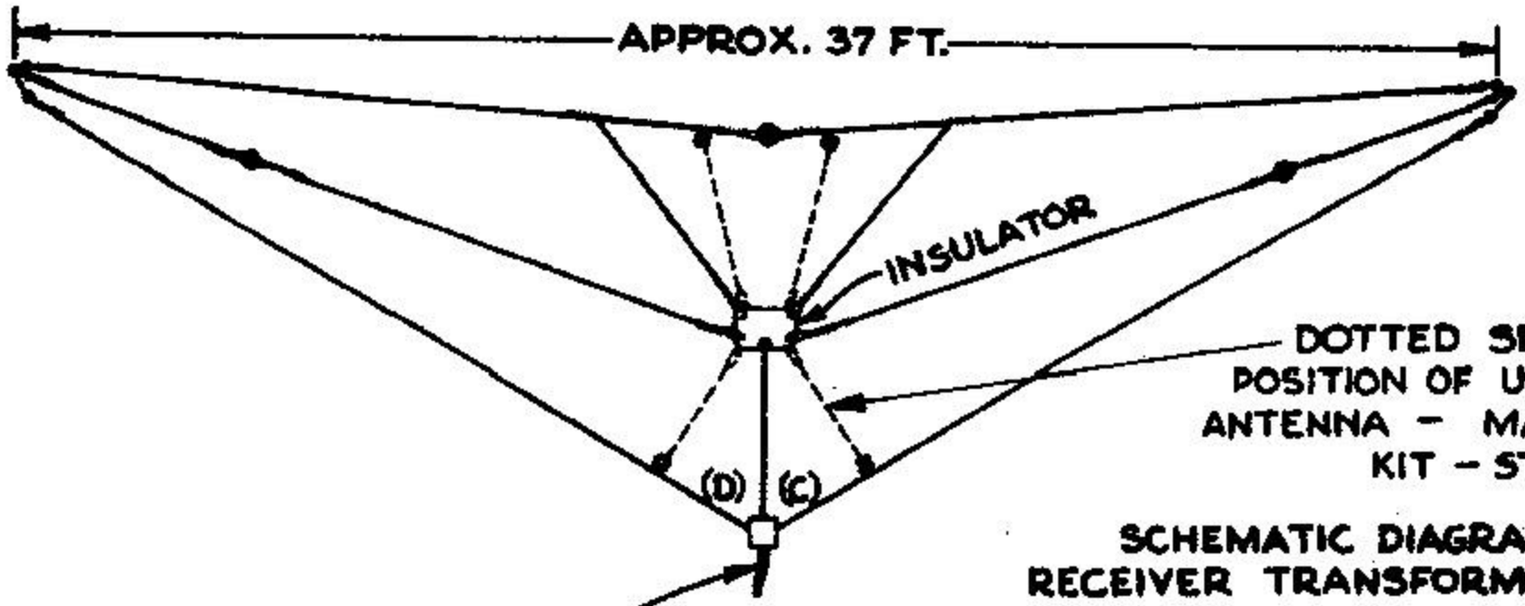
RCA SPIDERWEB



RCA MFG. CO., INC.

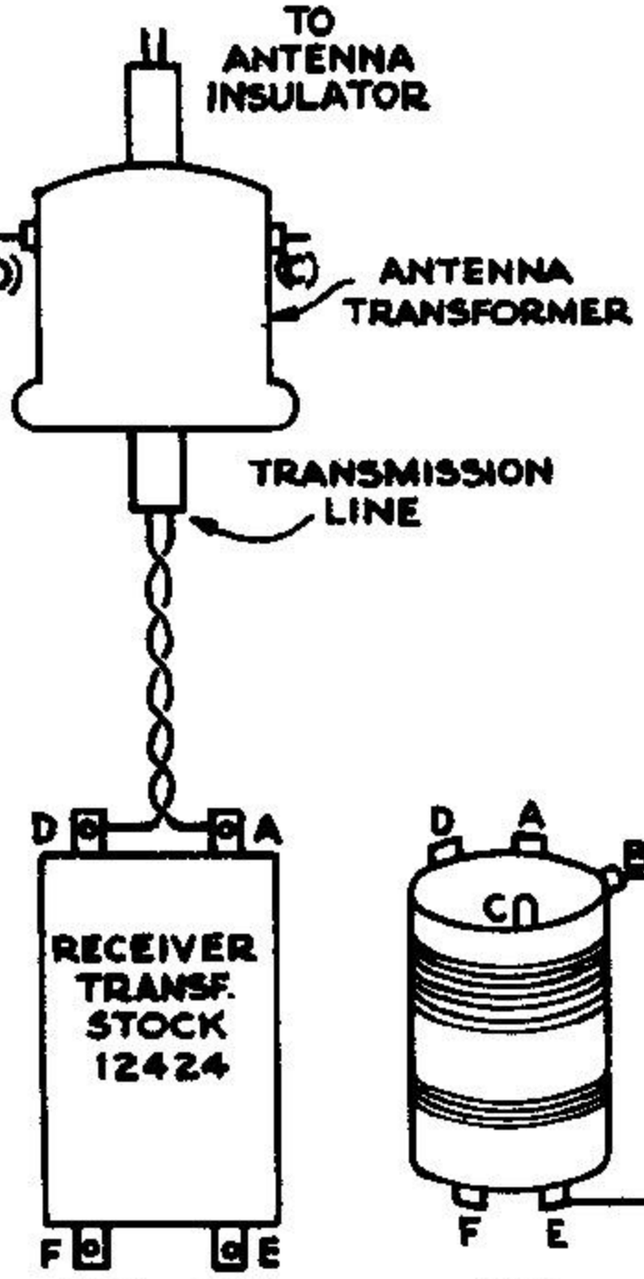
MODEL "Spider-Web"
Antenna
NOTES, CHANGES

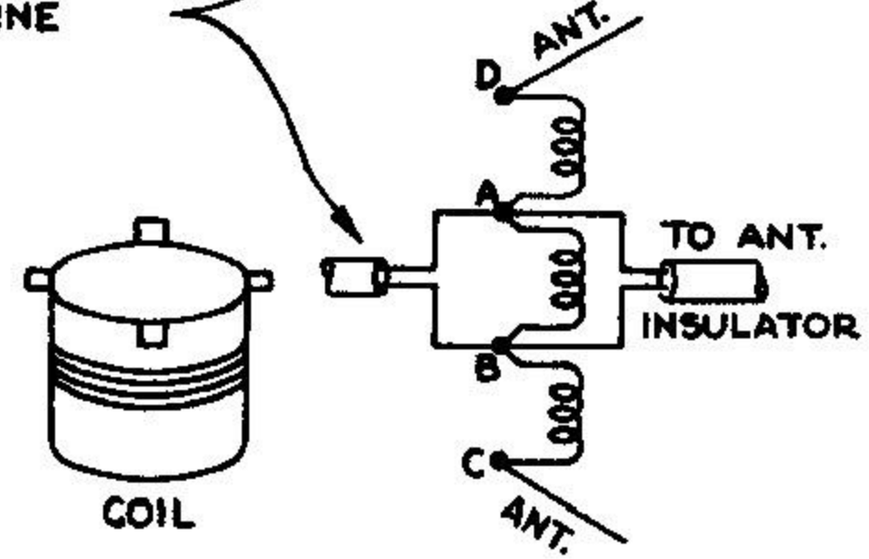
SPIDER-WEB ANTENNA STOCK Nº 9689



DOTTED SECTION SHOWS POSITION OF ULTRA SHORT-WAVE ANTENNA – MADE UP OF AUXILIARY KIT – STOCK NO. 9689

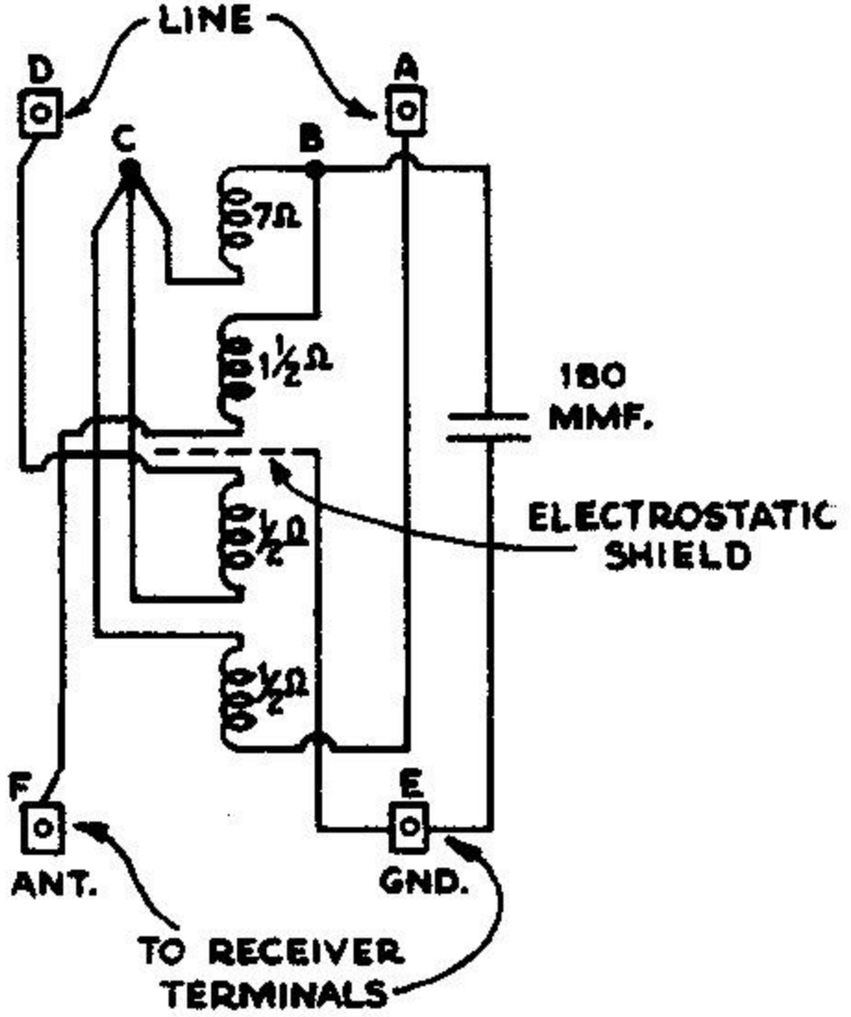
SCHEMATIC DIAGRAM OF RECEIVER TRANSFORMER STOCK 12424





SCHEMATIC DIAGRAM OF ANTENNA TRANSFORMER

THE EFFECTIVE RANGE OF ANTENNA IS FROM 140 TO 23,000 KC (4 BANDS) THE ULTRA HIGH FREQUENCY BAND (23 TO 70 MC) MAY BE COVERED BY THE ADDITION OF AUXILIARY KIT STOCK NO. 9689



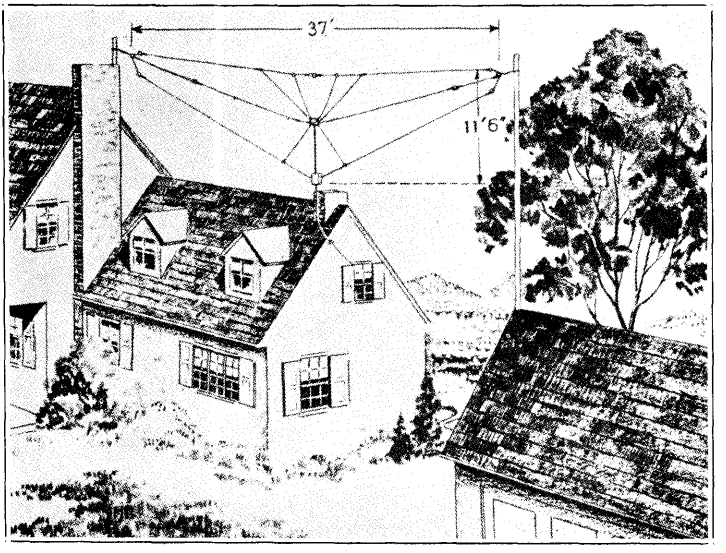


Figure 20
Typical "spiderweb" installation

after the system is completely installed and in operation. The error has in all probability been incurred because of antenna reactance and the optimum length therefore can be determined only by experiment. Short lengths of line can easily be added or removed by means of a four-pole double-throw switch and with a few trials, the proper length will be quickly found.

THE R.C.A. "SPIDERWEB" ALL-WAVE ANTENNA

The new R.C.A. Spiderweb Antenna might be termed the "Quindublet" antenna due to the fact that five doublets are coupled to a common transmission line. The high-frequency range runs from 6,000 to 70,000 kc., in which range it acts as an antenna-transmission line system. It also gives good response in the range from 140 to 6000 kc., in which range it acts as a modified T antenna. The operation of the "Spiderweb" is based on the same theory of operation as the double-doublet except that the larger number of doublets or dipoles used brings the resonant peaks closer together in the range above 6,000 kc., thus giving a more constant response over the high frequency range than is possible with the simpler, all-wave doublets and double-doublets.

The Spiderweb requires a span of 38 feet and a vertical clearance of 12 feet below the line of the span. Due to the fact that it can be supported at just two points it is somewhat simpler to install than the conventional double-doublets, which require four supports. The standard Spiderweb only goes up to 23,000 kc., but the addition of the ultra-high-frequency dipole assembly adds the 23 to 70 mc. range to the antenna.

Doublets Efficient Collectors

If several doublets of different lengths are connected to the same transmission line without any one harming the performance of the other, the resultant antenna will have good signal pickup in several bands of frequencies, namely the bands in which each of the doublets is resonant. If the doublets are selected so that the resonant frequencies of any pair are not too far apart the overlapping of their characteristics will hold up the in-between bands, thus giving uniform signal pickup over a much wider range of frequencies than could be obtained by a single doublet. Five such doublets are effectively utilized in the new R.C.A. Spiderweb antenna system. Figure no. 20 shows how this antenna appears when erected. The bottom wires "E" and "F" are resonant at 6 megacycles (49 meters), "A" and "B" at 12 megacycles (25 meters), "C" and "D" at 18 megacycles (16 meters), "G" and "K" at 35 megacycles (9 meters), and "L" and "H" at 60 megacycles (5 meters). "E" and "F" are closely coupled to the line through an auto transformer which lowers the resonance of this doublet to the desired

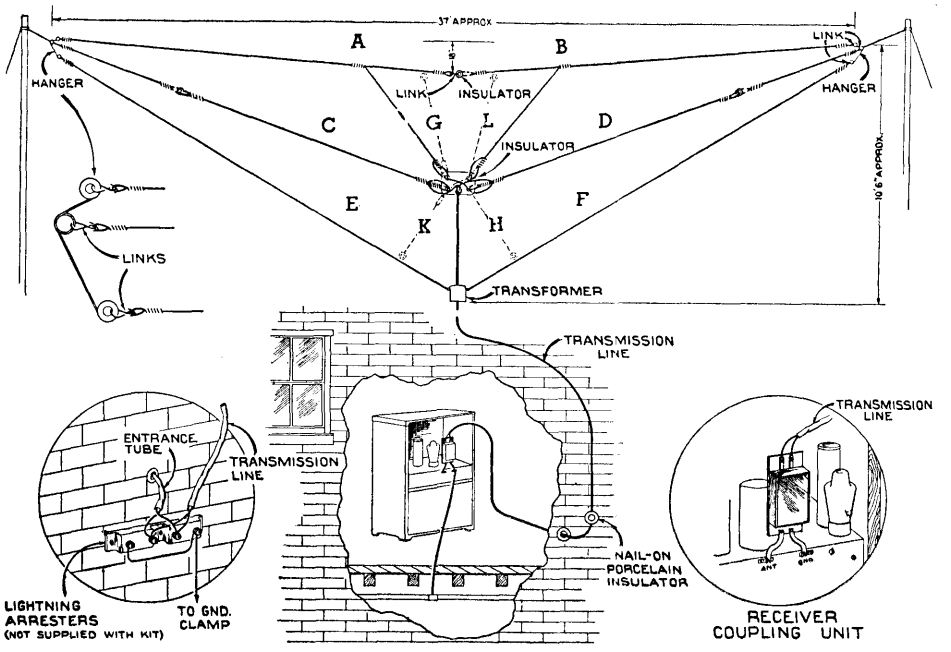


Figure 21
Schematic diagram of the "spiderweb" antenna system

frequency, 6 megacycles. This transformer is enclosed in a moisture-proof container and is supported in the network by the 6 megacycle doublet (bottom wires) and the short transmission line directly below the crossover insulator.

Loading Coils Used

Loading coils are used in the 35 megacycle doublet "G" and "K" because satisfactory space for a longer vertical doublet is not available in the network.

The lengths of the doublets have been carefully chosen for the best utilization of the space and so that the overlapping of two adjacent dipoles will hold up the intermediate frequencies between bands, thus giving practically uniformly high performance over the entire range (5 to 70 megacycles) covered by the dipole antennae.

When receiving signals in the range of 140 to 5,000 kilocycles, the whole network functions as a single unit.

The main Spiderweb kit will effectively pass signals in the frequency range of 140 to 23,000 kilocycles. The two doublets, "G-K" equipped with loading coils and "L-H", shown dotted in figure 21, are furnished complete ready to assemble to the main network in the R.C.A. Spiderweb Accessory Kit. With this pair of dipoles attached to the main network full coverage is obtained (140 to 70,000 kilocycles).

A feature of importance incorporated in this design is superior noise reduction on those bands affected mostly by man-made interference, namely the "C" and "D" bands (6,000 to 70,000 kilocycles). Within these bands the intercepted signals are usually quite weak and man-made interference is generally the strongest and most localized. The noise reduction is obtained by erecting the Spiderweb Multiple Dipole Antenna remotely to the source of greatest interference and coupling it to the receiver through a balanced non-pickup transmission line. Seventy-five feet of line is assembled to the network. In case additional line is required, 45-foot units are available, which may be added. These units must not be cut, as the line terminates at the receiver in a carefully designed transformer which is matched to the line impedance.

It should be emphasized that any of the all-wave systems described should be high and in the clear, to provide maximum signal and minimum noise pick-up; also the feeder cable should be of good quality so that the signal is not unduly attenuated before it reaches the receiver.

Several windings are needed in each transformer in order to cover the wide frequency range. Automobile ignition noise is greatly reduced, as can be explained by referring to Fig. 115. *"S"* represents a

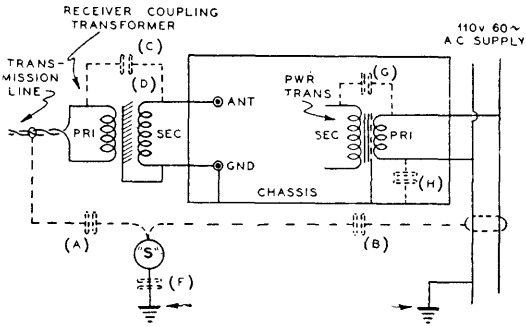


Fig. 115

source of auto ignition noise; (*A*) the capacity coupling from *"S"* to transmission line; (*B*) the capacity coupling from *"S"* to the power supply line; (*H*) the capacity coupling from one side of the power supply line to the metal chassis; (*F*) the capacity coupling from *"S"* to actual earth ground.

The noise voltage that would be induced by capacitive coupling (*A*) into the transmission line would correspond to an in-phase signal and would be fed to the secondary of the coupling transformer by the capacity by the electrostatic shield (*D*). This prevents noise voltage from being developed across the input terminals of the radio receiver.

The noise voltage that would be induced by capacitive coupling (*B*) causes current to flow through the power transformer and develop a noise from ground to chassis through capacity (*H*). If no receiver coupling transformer is used, this voltage would occur across the input terminals of the receiver and cause noise interference. Most power transformers have an electrostatic shield between the primary and secondary windings in order to minimize the capacitive coupling (*G*). 110 volt a-c supply lines often carry noise interference.

RCA Spiderweb Antenna

● The action of this antenna is like that of a "T-type" over the range from 140 to 4000 KC. Above 4000 KC the system automatically operates as an efficient multiple doublet up to 70,000 KC with good noise reduction between 4,000 and 70,000 KC. Half wave doublets operated near resonance are extremely efficient. See Fig. 116. Several doublets of different lengths can be connected to the same transmission line without effecting the performance of any other, resulting in good signal pick-up in several bands of frequency. If the selected resonant frequencies are not too far apart, the overlapping of their characteristics will tend to give fairly uniform response. Five doublets are utilized in the RCA Spiderweb Antenna System.

In Fig. 116 the bottom wires *E* and *F* resonate to 6 MC (49 meters) by means of a small loading coil. *A* and *B*, at 12 MC (25 meters); *C* and *D* at 18 MC (16 meters); *G* and *H* at 35 MC (9 meters); *K* and *L* at 60 MC (5 meters). Loading coils are used in the *G* and *H* doublet, as well as in the *E* and *F* doublet.

The transmission line requires 75 feet of twisted-pair wire, although 45-ft. sections can be added if the 75-ft. length is not sufficient. These lengths must not be changed, because the receiver coupling transformer is matched to the line for these lengths. The transformer has a balanced primary and an electrostatic shield which prevents capaci-

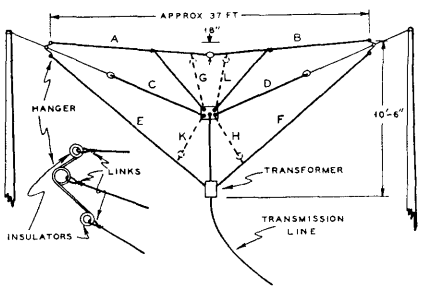


Fig. 116
RCA Spiderweb Antenna.

tive coupling. This is necessary for noise elimination. No noise reduction is secured for frequencies below 4,000 KC because the antenna acts as a T-type on the lower frequencies. The space required for this antenna is a span of 38 feet, and a 12 foot vertical clearance.

Philco All-Wave Antenna

● This doublet antenna is approximately 60 feet long and has a special antenna transformer connected to a twisted-pair feeder for all-wave reception from 540 KC to 23,000 KC. See Fig. 117.

A receiver impedance matching transformer is required for radio receivers which have a high impedance primary circuit. This transformer is not needed with radio receivers which have low impedance primary circuits designed for doublet antenna connection. The transformer is provided with