

INSTALLATION INSTRUCTIONS

for the
RCA SPIDER WEB ANTENNA SYSTEM
Stock Nos. 9685 and 9689

General

The demand for an effective, easily installed, reliable antenna system to give adequate reception with the modern multi-band receivers has necessitated research and development work which has resulted in the production of the RCA Spider Web Antenna. This antenna is a combination of carefully balanced doublets with transformers and transmission line skillfully assembled and completely soldered at the factory, thus reducing the work for erection to a minimum.

The Stock No. 9685 Kit as supplied, effectively brings in all signals from 140 to 23,000 k. c. (4 bands). However, to those who desire to cover the ultra high frequency band (23 to 70 megacycles) the Stock No. 9689 Auxiliary Kit is available at a nominal cost. The Auxiliary Kit consists of a pair of short dipoles assembled complete with insulators, and with the necessary loading coils soldered in place, all ready to add to the main spider web network.

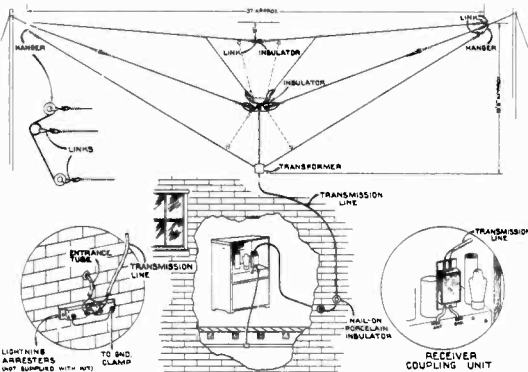


Figure 1—Spider Web Antenna System

Description

The Stock No. 9685 Antenna Kit consists of:

- (1) A complete antenna network assembled with transformer, insulator, link, and connections as shown in Figure 2.
- (2) Two specially designed hangers for attachment and proper spacing of antenna wires.

- (3) Seven special attachment links for attaching antenna and suspension wires to hangers.
- (4) Antenna Receiver Coupling Transformer having two terminals for attachment of transmission line and two terminals with links for attachment to receiver.

- (6) **Suspension.**—Attach one end of the suspension or strain wire or rope to the support and the other end to the mid-loop of one of the hangers, and secure in place on mast or other support.
- (7) Estimate and check length of other suspension line (if metal), should be throughout in lengths not greater than 16 feet separated by insulators, and then attach one end to second hanger and string antenna in place to second support with rope and pulley or other convenient means. Allow slack as suggested under "Location."
- (8) **Transmission Line.**—Attach transmission line to wall or other exterior surface with nail-on knobs or other insulating device, in such a manner as to avoid future damage to the insulation or to the line from effects of swaying, wind and weather. There should be a slight tension in the transmission line to prevent antenna from severe swaying in the wind. Secure lead-in porcelain tube insulator in place through wall, thread transmission line through tube and carry to receiver. Any surplus length of transmission line may be wound into a coil and secured with tape or strap. The transmission line may be attached to interior walls with insulated staples.

Note.—The transmission line must not be allowed to pull the antenna to one side towards support so that it hangs with the center line more than slightly deflected from the vertical. A transmission line at an angle of 45° or more in the plane of the Antenna wires will do this. It will then be necessary to straighten up the installation so that it hangs symmetrically. This may be accomplished by stretching a strong, light rope from a point on the transmission line just below the transformer to a convenient anchorage, so that the short length of transmission line between crossover insulator and transformer becomes approximately vertical.

A pull at right angles to plane of suspension does not affect the performance of the Stock No. 9685. But with the "D" band Auxiliary (No. 9689) attached, the symmetrical placement of the four short antenna wires about an axis, as near vertical as possible, is an essential to best performance. Any deflection must therefore be remedied in the manner described above.

- (9) Strip the ends of the leads of the transmission line and attach to the two upper unmarked terminals on the Coupling Transformer.
- (10) **Receiver Coupling Transformer.**—Attach the links to the "Ant" and "Gnd" terminals of the Coupling Transformer in such manner that they will fit the "Ant" and "Gnd" terminals on the Radio Receiver chassis. Mount Coupling Transformer in place on receiver, being sure to use the links provided, as very short connections are essential to good performance.

Note.—New RCA receivers have three terminals on the back of the chassis, marked A2, A1, and G. The "Ant" terminal of the Coupling Transformer should be attached to A1 and

the "Gnd" terminal and ground wire to G. The A2 terminal is not used with the Spider Web Antenna installation.

- (11) **Ground.**—Attach a ground wire to the "Gnd" (or G) terminal or clip of the receiver and carry to water pipe or metal stake driven 5 to 8 feet into the soil. A clean metallic connection should be made, using a proper ground clamp.
- (12) **Lightning Arrestor.**—Where local ordinance requires, a lightning arrestor may be attached preferably on the outside wall at the point at which the transmission line enters the building. The two transmission line wires, stripped at entrance points, are to be connected as shown in Figure 1.

(13) **Lightning Arrestor.**—When denatured by local ordinance.

(14) **Lightning Arrestor.**—When denatured by local ordinance.

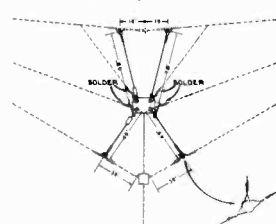


Figure 3—Auxiliary Antenna

- (13) **Auxiliary Antenna, Stock No. 9689.**—To attach the Auxiliary Antenna wires, which are provided in a separate package containing four coils with insulators and choke or loading coils assembled, proceed as follows:
 - (a) Locate the points on the top and bottom main antenna wires to which the auxiliary wires are to be attached. These points are 18 inches from the corner insulator for the top wires and 30 inches from the transformer on bottom wires. (See Figure 3.)
 - (b) Unwind one of the auxiliary coils that has the loading or choke coil attached, and lay it out in place with insulator end at the attachment point at left on the top main wire, and the other end at the crossover insulator. Take one of the tie wires, place it in groove round insulator and coil it firmly and securely round the main wire on both sides of insulator. It is recommended that these connections be soldered. Loop the other end of the auxiliary antenna wire through the top left hole of the crossover insulator so that the choke is one inch from the corner of the crossover insulator. Wrap the end of the wire one turn around itself and then several turns tightly around the main network antenna wire at this point, and solder in place.
 - (c) Unwind the other auxiliary coil with choke attached, lay out with insulator at attachment point at left on bottom main wire, and other end at crossover insulator. Attach

Additional requirements not supplied with the kit are:

- (1) One or more Nail-on Porcelain Knob Insulators for carrying transmission line on side of building or other supporting surface.
- (2) One Porcelain-tube Lead-in Insulator or equivalent for entrance of transmission line into building.
- (3) One Ground Wire with Ground Clamp for connecting ground wire to water pipe or to stake driven 5 to 8 feet into the soil.
- (4) Lightning Arrestor—When denatured by local ordinance.
- (5) Two Antenna Poles and Rope for suspension. The poles should be at least 12 feet high, but will not be necessary if other suitable supports are available.

The auxiliary kit (Stock No. 9689) for ultra short-wave reception consists of:

- (1) Two antenna wire coils, each approximately 5 feet long and equipped with insulator.
- (2) Two antenna wire coils, each approximately 5 feet long and equipped with choke coil and insulator.
- (3) Four tie wires for attaching insulators in place on main network.

Location

Preliminary to the installation the location and direction of the antenna has to be decided upon. The following requirements must be given consideration in order to provide for best reception.

- (1) Antenna wires must be well clear of roof and other surfaces or objects, particularly of metal. In the open, when the sides of buildings, trees or masts are used for suspension, the antenna wires should be free from all possible obstruction. Higher elevations will usually be found more advantageous. It is preferable to string the antenna at about the same height above ground at each support.

- (2) The direction of the antenna wires should be such that the span is at right angles to the line of direction of the location of any station whose short-wave signal in particular it is desired to receive. However, the antenna should not parallel trolley wires, main automobile highways, telephone lines, power lines, and other sources of electrical wave production, but should point towards such sources of electrical disturbance in the immediate vicinity.

- (3) A clear run of 38 feet between supporting points is required to allow for the strain or suspension wires or ropes and their attachment to rigid supports. Allowance must also be made for sag in the antenna wires. The mid-point of the uppermost wires should be about 18 inches below the level of the top of the hangers. If pulled up too tight the wires are apt to break with added force due to snow, ice, and wind in severe winter weather. Furthermore, the antenna, due to its design, will not hang properly if the sag is not approximately 18 inches.

to main network as in paragraph (b) above, but with the choke coil two inches from the corner of the crossover insulator.

- (4) Unwind and attach the other auxiliary coils on the right hand side of the main network in a similar manner to the two former.

Note.—The auxiliary installation should hang as near vertically as possible, as explained in paragraph 8 Note.

Service

Although easy to install, it may be preferable to have an experienced radio service engineer make the installation. A request to your dealer or service engineer should be made and he will take care of the complete installation at a nominal charge.

Antenna Information

With the advent of "all-wave" radio receivers, the antenna installation has become a fundamental, rather than an incidental, problem. Short waves are used primarily because of their ability to travel great distances with relatively low transmitting power. Upon reaching the receiver, therefore, these waves are, in general, far weaker and fade much more severely than those from stations in the standard broadcast band (540 to 1,600 kilocycles). Obviously, the antenna must perform very efficiently in the short-wave spectrum; it must be able to transfer signals to the receiver with negligible loss or reliable results will be practically impossible.

Short-wave broadcasting covers a very wide frequency range, being segregated by international agreement into seven principal narrow bands located approximately at 11, 13, 16, 19, 25, 31, and 49 meters. There are also experimental bands between 5 and 10 meters. For any given length, an antenna will favor certain frequencies and tend to reject others. A system comprising a series of carefully bal-

anced doublets, however, admirably serves the purpose of covering the required wide range.

The Stock No. 9685 incorporates three distinct doublet-type antennas, and when the Stock No. 9689 is added, five. The doublets are of different lengths, being tuned to different frequencies. They are cross-connected, so that each compensates for weak points of the other at various intervening frequencies. Signals intercepted by the doublets are fed to the receiver through a balanced, twisted-pair lead-in or transmission line and a specially constructed receiver-coupling transformer. The length of the transmission line and coupling ratio of the transformer are correct to allow proper electrical matching for greatest energy transfer.

While natural static is almost negligible in the short-wave spectrum, "man-made" interference is often very severe. Such interference usually is of local origin, radiated by the house wiring or by external electrical apparatus, such as the ignition systems of passing automobiles. It is "picked up" by the ordinary antenna lead-in as well as the antenna proper. Doublet antennas, however, are particularly advantageous from a standpoint of noise reduction, since the transmission line does not form an active part of the system, but serves merely to transfer signals from the doublets to the receiver. In this system, complete rejection of signals "picked up" along the transmission line is achieved by means of a special shield in the receiver-coupling transformer.

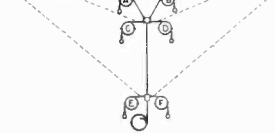


Figure 2—Antenna Lead Out Before Installation

Installation

If masts or other supports necessitating guy wires are used these wires should not be in lengths greater than 16 feet without interruption by means of insulators. Such insulators can be obtained from dealers, for building up long lengths of guy wires. The same also applies to strain wires from hangers to supporting points.

The following steps are advised as the simplest and best sequence for installation, and the avoidance of possible entanglement of the network.

- (1) Lay out antenna, as shown in Figure 2, on flat surface in convenient proximity to supports.

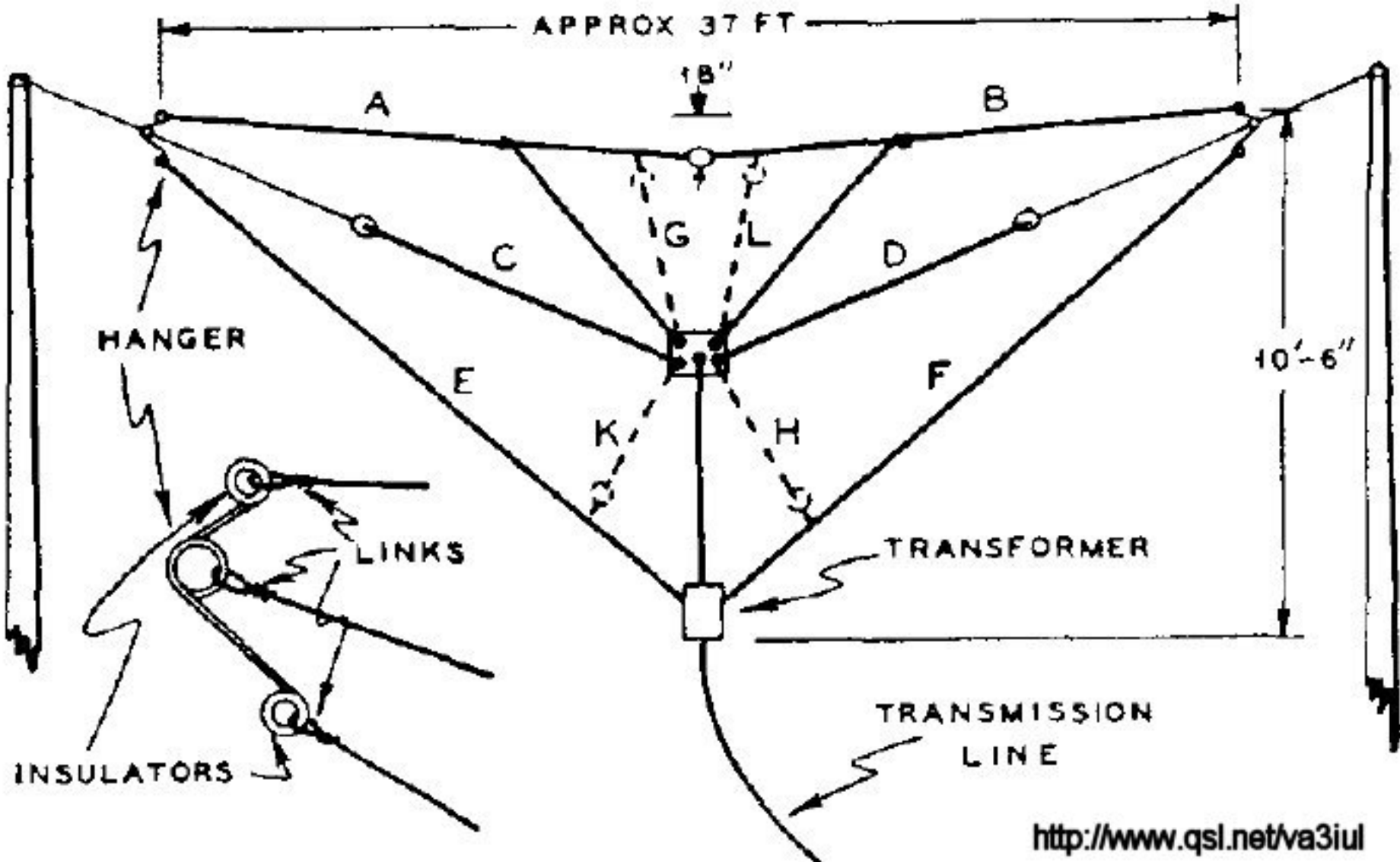
- (2) Remove shipping tape and carefully unwind coils A and B (Figure 2), keeping wire straight and free from twists. Make connection with special link, to top insulator of each hanger, as each wire is unrolled. Make connection with special link, at center, with loop out coil A to insulator on coil B.
- (3) Unwind coils C and D (Figure 2), keeping wire straight and free from twists. Make connection with special link to center loop of each hanger as each wire is unrolled.

- (4) Unwind coils E and F (Figure 2), keeping wire straight and free from twists. Make connection with special link to bottom insulator of each hanger as each wire is unrolled.

- (5) Check the approximate length of transmission line required, and, if necessary, splice an additional length of same type of cable. This is obtainable from your dealer in lengths of 45 feet. These lengths should not be cut, but any excess should be coiled, taped and secured in a convenient place. If an auxiliary ultra short-wave antenna is being used it should now be connected in place on the main network as described in paragraph 13.

Replacement Parts

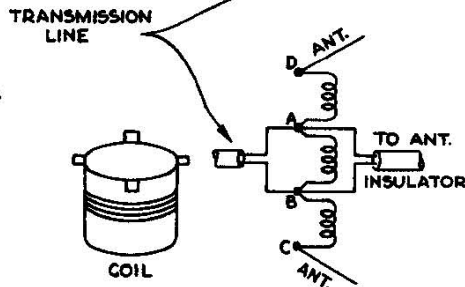
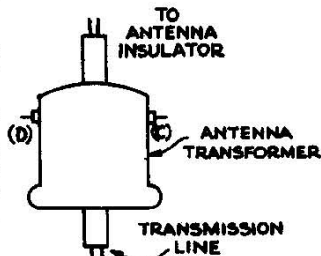
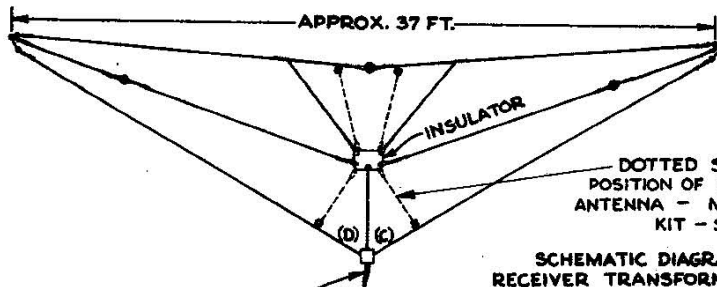
Stock No.	DESCRIPTION	Stock No.	DESCRIPTION
12425	Hanger—Antenna hanger complete with insulators	12427	Link—Connecting link used at insulators—Package of 6
4327	Insulator—Antenna crossover insulator	12424	Transformer—Receiver coupling transformer
12426	Insulator—Antenna insulator—Package of 8	12429	Transmission Line—Special lead in cable—45 feet long
4753	Link—Coupling link—couples receiver transformer to receiver chassis—Package of 10	12430	Transmission Line—Special lead in cable—90 feet long



RCA MFG. CO., INC.

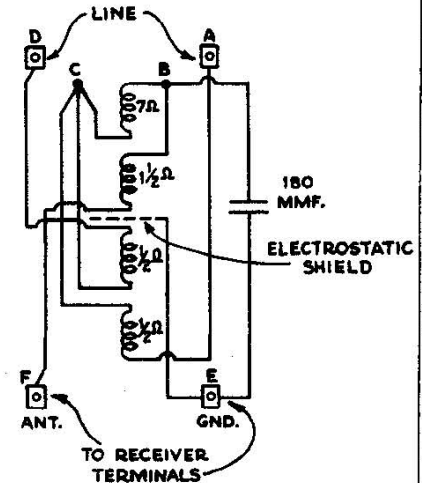
SPIDER-WEB ANTENNA STOCK NO. 9689

MODEL "Spider-Web"
Antenna
NOTES, CHANGES

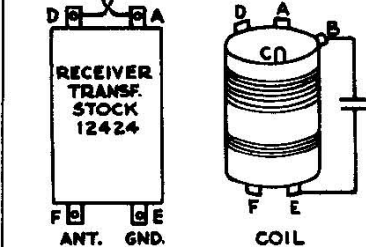


SCHMATIC DIAGRAM OF ANTENNA TRANSFORMER

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



RP-158, RP-162

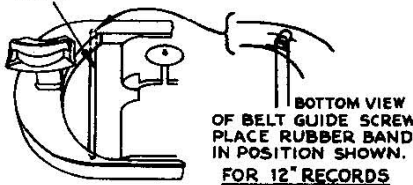
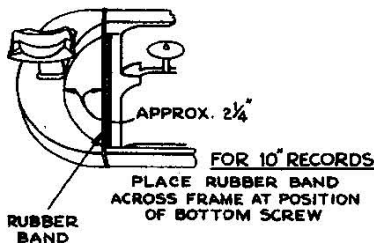


RP-158, RP-160

Tone Arm Stop Bracket:

On 2nd production RP-158 and RP-160, a stop bracket has been added to the top of the motorboard to restrain the tone arm. It is mounted by means of the same screw, lock-washer, and nut used to mount the pickup shorting switch. Where difficulty is experienced with excessive movement of the tone arm on 1st production mechanisms, this bracket may be added as shown. The bracket is Stock No. 39832.

RP-158, -160



RP-151 RECORD CHANGER

To Play One Record Continuously:

It is possible to play one record continuously on the RP-151 by stretching a 3/8-in. or 4-in. rubber band across the mechanism, as shown, to prevent the record dropping through the motorboard.

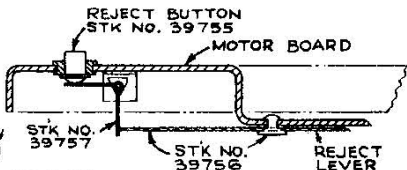
The continuous playing of a record in this manner is handy when the record changer is being serviced, especially after the separator knives have been checked and tested, and it is desired to allow the changer to run on the shop bench without attention.

Revised reject button and lever in RP-158, -162.

Change in Reject Lever and Button:

2nd production of RP-158 and RP-162 automatic record changers have a reject lever arrangement as shown in accompanying sketch.

Stock No.	Description	List Price
39755	Button—Reject button15
39756	Lever—Reject lever and stud25
39757	Lever—Reject button right angle lever10



RP-160

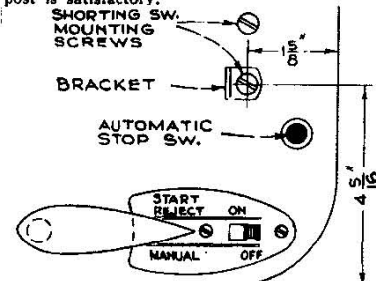
Tone Arm Return Lever Spring:

The tone arm return lever spring is listed as Stock No. 39599. The correct number is 39038.

V-215, V-221

Speaker RL-70N-6:

On 2nd Production of V-215 and V-221, the speaker is changed from RL-70M-2 to RL-70N-6. The replacement parts are identical. A rubber band stretched across the motorboard as shown permits continuous playing of one record on RP-151 record changer during service checking of the mechanism.

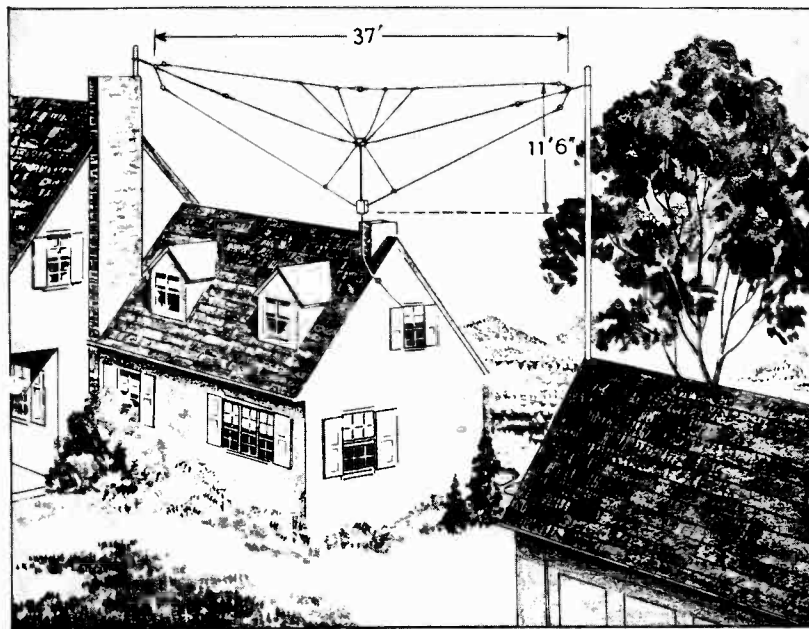


Tone-arm stop bracket (No. 39832) position on RP-158, -160.

Another RCA Antenna Leader . . .

RCA SPIDER-WEB ANTENNA SYSTEM

. . . a transoceanic communications type antenna for the home



List Price

\$8.95

Stock No. 9685

Combining its experience in transoceanic communications work with its knowledge of home receiver requirements, RCA has produced a remarkable new antenna system. This antenna, which is known as the RCA Spider-Web Antenna, consists of a series of doublet antennas and an improved transmission line to the receiver. It is so constructed that additional doublets may be added to increase the frequency range to 70,000 K.C. (4 meters). More stations, less noise on the short-wave bands and an extremely wide frequency range are built-in characteristics of this remarkable new antenna.

Only with the **RCA SPIDER-WEB ANTENNA** *do you get all of these features*

- **FULL FREQUENCY COVERAGE**—The RCA Spider-Web Antenna System gives excellent signal pickup over the frequency range from 140 to 23,000 kc. By adding the Stock No. 9689 High Frequency Kit, List Price \$1.50, the range is increased to 70,000 kc. with full noise reduction. This feature is especially important because of the increased frequency range of modern all-wave receivers. The high frequency kit may be added at any time, not necessarily when the antenna is first installed.
- **LESS NOISE**—The balanced doublets and transposed transmission line eliminate all pickup on the lead-in in the short-wave bands. This greatly reduces man-made static (noise) from automobiles and electrical devices that mar short-wave reception.
- **MORE STATIONS**—A multiple doublet of unique design insures greater signal pickup in every receiving band. You'll hear many stations not previously heard.
- **FACTORY ASSEMBLED**—Complete soldering and assembling make it possible to erect the antenna in a few minutes after providing supports.
- **STURDY CONSTRUCTION**—Use of seven-strand No. 22 wire and a truss-type mechanical design insures the strength necessary to withstand severe winter weather disturbances, including heavy ice formation. The illustration shows one of these installations at Camden, N. J., during the severe winter of 1936.
- **SMALL SPACE REQUIRED**—A span of 38 feet and a vertical clearance of 12 feet are the entire space requirements of the RCA Spider-Web Antenna. You'll find it easy to install in almost any location. Because double-supports are eliminated, it is considerably easier to install than the former double-doublet antenna systems.

