

AWACM-176
Antique Wireless Museum, Bloomfield, NY

Stromberg-Carlson

No. 734

Universal Type

A. C. Radio Receiver

**FOR ANTENNA OR LOOP TO
OPERATE DIRECT FROM 50-60
CYCLE 105-125 VOLT A. C.
HOUSE LIGHTING CIRCUIT**

REFERENCE BOOK

Printed in U. S. A.

NOTICE

In cases where quietness of operation is more desired than maximum distance getting ability, the UX-201-A tube may be substituted for the UX-200-A tube in the Detector Socket.

Stromberg-Carlson Telephone Mfg. Co.

Stromberg-Carlson

No. 734-B

Universal Type

A. C. Radio Receivers

INSTRUCTIONS FOR INSTALLING AND OPERATING

Copyrighted 1927
by Stromberg-Carlson Telephone Mfg. Co.

*Extra Copies Furnished at
One Dollar Each*

Stromberg-Carlson Telephone Mfg. Co.

ROCHESTER, N. Y., U. S. A.

Chicago, Illinois

Kansas City, Mo.

Toronto, Canada

P-17555, Form 1268 (6-30-28)

§ 1—WARRANTY FORM AND REGISTRY CARD

The Warranty Form and attached Registry Card, which should accompany each Stromberg-Carlson Radio Receiver, is reproduced in Figure 1. The Warranty reads as follows:

WARRANTY

"We warrant each new radio receiver manufactured by us to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall, within ninety (90) days after delivery of such receiver to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective, this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any representative or other person to assume for us any other obligation in connection with the sale of our receivers.

This warranty shall not apply to any receiver which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor which has had the serial number altered, defaced or removed. Neither shall this warranty apply to any receiver which has been connected otherwise than in accordance with the instructions furnished by us.

We make no warranty whatever in respect to tubes, batteries, chargers or other accessories not manufactured by us, inasmuch as they are usually warranted by their respective manufacturers.

THIS WARRANTY IS LIMITED TO THE ORIGINAL PURCHASER OF A NEW RECEIVER FROM AN AUTHORIZED STROMBERG-CARLSON DEALER WHO HAS OBTAINED THE RECEIVER DIRECT FROM THE STROMBERG-CARLSON FACTORY.

Subject to the above conditions, this Warranty shall become effective only when this form has been issued and countersigned by an authorized Stromberg-Carlson dealer and when the receiver covered hereby is registered at the factory by the original purchaser."

STROMBERG-CARLSON TELEPHONE MFG. CO.

M. Roy McManus
President.

IMPORTANT:

Inasmuch as this warranty is dependent upon the purchaser's possession of the Warranty Card properly filled in to show that he is the original purchaser of a new receiver from an authorized dealer, it is imperative that every Stromberg-Carlson owner insist upon the dealer's issuing him a Warranty Form, as shown in Fig. 1, countersigned with the dealer's name and store address and with a Registry Card attached.

THE PURCHASER SHOULD FILE THIS FORM IN SOME SAFE PLACE.

WARRANTY ON STROMBERG-CARLSON RADIO RECEIVERS

(Name of Purchaser) _____ (Street Address) _____ (City) _____ (State) _____ (Zip) _____

This Receiver was purchased from the undersigned, the following Radio Receiver: Code No. _____ Serial No. _____

This Receiver was manufactured by the Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., whose warranty covering same is as follows:

WARRANTY

We warrant each new radio receiver manufactured by us to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to making good at our factory any part or parts thereof which shall, within ninety (90) days after delivery of such receiver to the original purchaser, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective, this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and we neither assume nor authorize any representative or other person to assume for us any other obligation in connection with the sale of our receivers.

This warranty shall not apply to any receiver which shall have been repaired or altered outside of our factory in any way so as, in our judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor which has had the serial number altered, defaced or removed. Neither shall this warranty apply to any receiver which has been connected otherwise than in accordance with the instructions furnished by us.

We make no warranty whatever in respect to tubes, batteries, chargers or other accessories not manufactured by us, inasmuch as they are usually warranted by their respective manufacturers.

THIS WARRANTY IS LIMITED TO THE ORIGINAL PURCHASER OF A NEW RECEIVER FROM AN AUTHORIZED STROMBERG-CARLSON DEALER WHO HAS OBTAINED THE RECEIVER DIRECT FROM THE STROMBERG-CARLSON FACTORY.

Subject to the above conditions, this Warranty shall become effective only when this form has been issued and countersigned by an authorized Stromberg-Carlson dealer and when the receiver covered hereby is registered at the factory by the original purchaser.

STROMBERG-CARLSON TELEPHONE MANUFACTURING CO.

M. Roy McManus
President.

The above warranty includes the provisions of the standard form of warranty recommended by the Merchandising Council, Radio Division, National Electrical Manufacturers' Association.

The undersigned hereby certifies that he is an authorized Stromberg-Carlson dealer and that the radio receiver listed above is, in fact, a new receiver obtained direct from the Stromberg-Carlson factory and that the purchaser above specified is the original purchaser thereof.

(Dealer's Store Address) _____ (Signature of Dealer) _____

NOTICE: This warranty is valid only after the attached Registry Card has been received at the factory.

P-16248 Form No. 1248 4-1-38

VOID

REGISTRY CARD

Serial No. _____ Date _____

Gentlemen:

I have just purchased a Stromberg-Carlson Receiver, Code No. _____, bearing the above serial number from _____

Dealer's Name _____

Dealer's Address _____

Installed by _____

Accessories used _____

I hold warranty countersigned by the above as a duly authorized Stromberg-Carlson Dealer and request your validating this warranty by its registration.

Owner's Name _____

Address _____

Fig. 1—This is a facsimile of the large Standard Warranty Form and attached Registry Card, which every Purchaser should obtain from his Dealer, countersigned by the Dealer with his signature and store address.

Furthermore, inasmuch as this warranty does not become effective until the Registry Card, properly filled in by the purchaser, is received at the Stromberg-Carlson factory, it is equally imperative that the new Stromberg-Carlson owner mail us this Registry Card immediately upon receipt of his receiver. Be sure to give the Serial Number and the Code Number correctly.

The receipt of this Registry Card at our factory not only protects an owner by making effectual the warranty contract form which he holds, but also places him on our mailing list for service helps and information on improvements which may be made on his set.

It is the policy of Stromberg-Carlson engineers to so design improvements that they may be incorporated, as far as possible, in existing Stromberg-Carlson receivers. The original Stromberg-Carlson receivers have been brought up to date from time to time in accordance with this policy, and are by no means obsolete. Although the present series of Stromberg-Carlson receivers would seem to be the ultimate development which may be expected in radio receivers for many years, it is nevertheless to the purchaser's advantage to have his receiver and accessory equipment on file in our records, so that we may be able to suggest changes or additional apparatus which future research may show to be warranted.

§ 2—PATENT PROTECTION

The Stromberg-Carlson Telephone Mfg. Co. is licensed to manufacture and sell radio apparatus under patents of:

Radio Corporation of America.

General Electric Company.

Westinghouse Electric and Manufacturing Company.

American Telephone and Telegraph Company.

Hazeltine Corporation.

La Tour Corporation.

Lektophone Corporation.

Conner-Crouse Corporation.

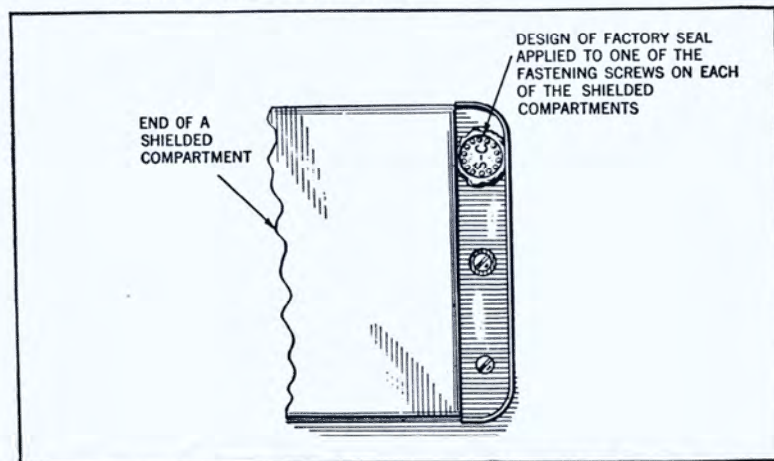


Fig. 2—Design of Protecting Seal as applied to each of the shielded compartments of a Receiver. The factory guarantee is contingent on these Seals remaining unbroken.



Fig. 3—Stromberg-Carlson No. 734-B Receiver. Drop Panel Open to show Location of Controls.

The field covered by the patents under which this company is licensed and by its own patents is so extensive that Stromberg-Carlson engineers are not limited by restrictions in design.

Moreover, the degree of protection enjoyed by the Stromberg-Carlson Telephone Mfg. Co. is an indication to dealers and to owners of its receiving sets that this company will maintain permanently its position in the industry.

§ 3—INTRODUCTION

The Stromberg-Carlson No. 734-B Radio Receiver is an instrument of the finest quality arranged to operate from the usual house lighting system of 105 to 125 volt, 50-60 cycle alternating current without the use of batteries, liquids, or any device requiring frequent service or attention.

Connections have been so simplified that this new "AC" Receiver may be installed in semi-darkness, requiring no thought as to polarity or a color-code of connections. Once installed it requires no attention except the replacement of vacuum tubes about once every two years. (This period will vary, depending upon the actual number of hours the receiver is used). This receiver is designed to reproduce a radio program picked up on an antenna or loop, and to reproduce, with a new and amazing faithfulness, the speech or music recorded on lateral phonograph records, when used in conjunction with the electro-magnetic pick-up, scratch filter and volume control employed in the Stromberg-Carlson No. 1 Phonograph Pick-up Outfit.

A critical public will marvel at the fidelity of reproduction provided by this instrument when used with the No. 10 (Floor Type) or No. 11 (Wall Type) Cone Speaker. The Stromberg-Carlson No. 10 or No. 11 Speakers are alone recommended for use with this receiver because they will reproduce correctly any note in the musical scale with ample volume to fill the largest living room of a home without paper rattle, without resonance frequencies, and without additional overtones of their own. The new audio system employed in this receiver is designed to amplify uniformly all of the useful frequencies of the entire musical range. This combination of receiver and speaker makes possible a "level" reproduction, no one tone being exaggerated, but all being retained with their proper volume and shading.

This new AC Stromberg-Carlson receiver consists of two interdependent units: the No. 404 Socket-Power Unit, and a receiver chassis arranged for antenna or loop operation, all housed in a Figured Walnut Art Console Cabinet. The receiver circuit comprises three stages of doubly shielded and neutralized tuned radio frequency amplification, one totally shielded and neutralized stage which serves as an untuned fourth radio frequency amplifier for loop operation or as a coupling tube when used with antenna, a doubly shielded detector system, and two shielded stages of high quality audio frequency amplification.



Fig. 4—No. 734-B Receiver, showing No. 404 Socket-Power Unit Installed in its Compartment.

§ 4—ACCESSORY APPARATUS REQUIRED FOR AN INSTALLATION OF THE STROMBERG- CARLSON NO. 734-B RECEIVER

A. FOR RADIO RECEPTION

- 1 Choice of:
 - (a) Stromberg-Carlson No. 10 "Tip-Top-Table" Cone Type Loud Speaker. (See Section 29 and Fig. 35.)
 - (b) Stromberg-Carlson No. 11 Wall Type Cone Speaker. (See Section 29 and Fig. 36.)
- 1 Choice or both of:
 - (a) Stromberg-Carlson No. 2 Antenna Outfit. (See Section 14.)
 - (b) Stromberg-Carlson No. 102 Envelope Loop, complete with mounting bracket and cable. (See Section 20.)

B. FOR REPRODUCTION FROM PHONOGRAPH RECORDS

- 1 Stromberg-Carlson No. 1 Phonograph Pick-up Outfit. (See Section 28.)
A Loud Speaker, as chosen above.
Steel Phonograph Needles, SOFT or MEDIUM grade.
Any standard Phonograph, or Phonograph motor and turntable, to rotate the record.

§ 5—INSTRUCTIONS FOR INSTALLING THE STROMBERG- CARLSON NO. 734-B RADIO RECEIVER

1. Remove rear panel of Cabinet, held in place by four corner screws. Remove cap screws at bottom of Cabinet anchoring Chassis in place (Fig. 6). Remove two screws locking front panel of Socket-Power Compartment (Fig. 7). Lift panel and slide in under top of cabinet to open compartment.
2. Remove two machine screws and lift Pickup Switch (Fig. 8) out of its position behind the "Record"—"Radio" escutcheon. Lay Pickup Switch and cord along the rear side of cabinet.
3. Draw Chassis almost out of cabinet, protecting surface of Drop Shelf with newspaper (Fig. 9).
4. Place the No. 404 Socket-Power Unit in its compartment in the Console Cabinet tube sockets to the front, as shown in Fig. 4. Anchor Unit in place with six bolts, three at each end.
5. Attach extension arm to on-off switch lever, as shown in Fig. 4. Attach Meter Adjuster knob to shaft and clamp with two set screws. Replace Pick-up Switch in position, as shown in Fig. 8, behind the "Record"—"Radio" escutcheon. Mount Pick-up Switch so that lever is inclined to left for phonograph record reproduction and points straight down for radio reception. Connect Multiple Connector Plug of Pick-up Switch Cord to its pin-terminal strip on chassis, as shown in Fig. 10.
6. Connect the terminal shoe of the A-B-C Supply Cable to binding posts on terminal strip of Socket-Power Unit. Insert pin plug (on red cord) into pin jack on terminal strip of Socket-Power Unit. (See Fig. 11.) Insert the electric light attachment plug to be found in the Socket-

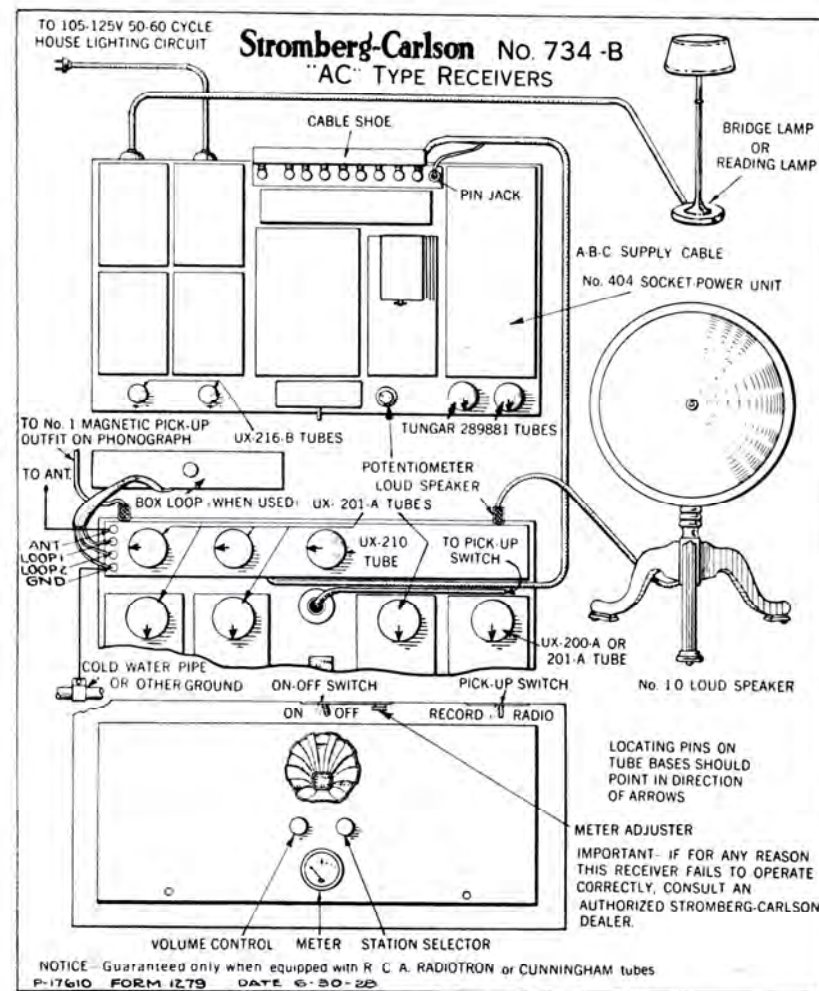


Fig. 5—Wiring Diagram. Stromberg-Carlson No. 734-B Receiver.

Power compartment into its outlet in the base of Socket-Power Unit. The other outlet in the base of Socket-Power Unit is for the attachment plug of a reading lamp, when used. (See Instruction 14.)

7. Replace the removable rear panel. As you do so, bring Antenna and Ground wires or Loop Cable and Ground Wire into Cabinet through slot "N" in removable panel. (Fig. 12.) Connect to binding posts on chassis. If Loop is used,

Connect Blue Wire to binding post marked "Loop—1."

Connect Blue-Black Wire to binding post "Loop—2."

Connect Black Wire to binding post "Gnd."

Always use a Ground Wire, even for loop operation. Run as short a lead as possible of fairly heavy wire to a cold water pipe or good earth ground. (See Section 18.)

8. If antenna type of pick-up is employed, push Antenna-Loop Switch (Fig. 16) down so that only the letter "A" shows above top of shield. (See Fig. 13.)

For Loop operation, pull Antenna-Loop Switch up so that the letter "L" is also exposed. (See Fig. 14.)

9. Place all vacuum tubes of receiving set and Socket-Power Unit in their respective sockets. (See Figs. 15 and 16.) Panel light should come already mounted in its socket. (See Fig. 17.) The bracket on which this socket is mounted has a little lug on the side so that this socket may be swung outward with the fingers for convenience for replacing panel light. After panel light is in its socket and receiver is in operation, adjust position of the light so that it properly illuminates the dial.
10. Push chassis back into its compartment in Cabinet. Connect A. C. supply cord attachment plug to house lighting socket or outlet. Insert Loud Speaker plug and Phonograph Pick-up Outfit plug (if used) in respective jacks at rear of chassis (Fig. 12.) Turn On-Off Switch to "ON."
11. Turn Meter Adjuster knob until meter pointer is on or slightly to left of the red line. Allow set to operate for five minutes to warm up the Tungar Bulbs.
12. When the set has been operating for five minutes, adjust the black knob of balancing potentiometer (Fig. 19) on base of Socket-Power Unit (in line with Vacuum Tube sockets) for position for quiet operation.
13. If a quiet operating position of the potentiometer cannot be found, reverse the position of the A. C. supply cord plug in the house lighting outlet or lamp socket. Close the cabinet panel of Socket-Power Unit compartment and fasten in place with Locking Screws. (See Fig. 7.) Turn up VOLUME control and tune receiver with the station SELECTOR knob.
14. A convenience outlet is provided in the rear of the cabinet (Fig. 12), in which a Reading Lamp or Bridge Lamp may be plugged, if desired. The lamp will then turn on or off with the Receiver. This use of a lamp is valuable as an additional pilot light or visual indicator that the set is or is not operating, and is convenient when receiving evening programs.

§ 6—THE STROMBERG-CARLSON NO. 404 SOCKET-POWER UNIT

The No. 404 Socket-Power Unit is a radio power plant of the finest quality, manufactured to Stromberg-Carlson specifications by the Radio Corporation of America.

The audio amplification system of the Stromberg-Carlson No. 734 Receiver is so effective, and the No. 10 or No. 11 Cone Speakers recommended for use with this receiver are so sensitive to a fundamental of low notes, that complete rectification and filtration for these very low frequencies must be employed in this unit. Any less efficient filter or rectifier would cause a disagreeable 60-cycle hum when operating this Receiver.

The Socket-Power Unit requires two R. C. A. No. 289881 Tungar Bulbs and two R. C. A. UX-216-B Rectifier or Cunningham CX-316-B Rectifier tubes. The Tungar Bulbs used with this unit should be purchased from an authorized Stromberg-Carlson dealer and should bear the Stromberg-Carlson label on the carton to indicate that they have been tested and approved by us for satisfactory operation in this unit. No charge is made for this inspection service.

If one of the UX-216-B type rectifier tubes or one of the Tungar Bulbs burns out after a considerable length of time in service, it is advisable to replace not only the burned out rectifier but its mate as well. (See Section 11 on "Useful Life of Vacuum Tubes.")

No current is being drawn from the house lighting circuit when the Receiver is not in operation.

The No. 404 Socket-Power Unit supplies A, B and C voltages and has sufficient current carrying capacity to operate six 5-volt D. C. type tubes with filaments in series, together with a UX-210 Super-Power Output Tube, supplying approximately 350-volts of Direct Current to the plate of the latter.

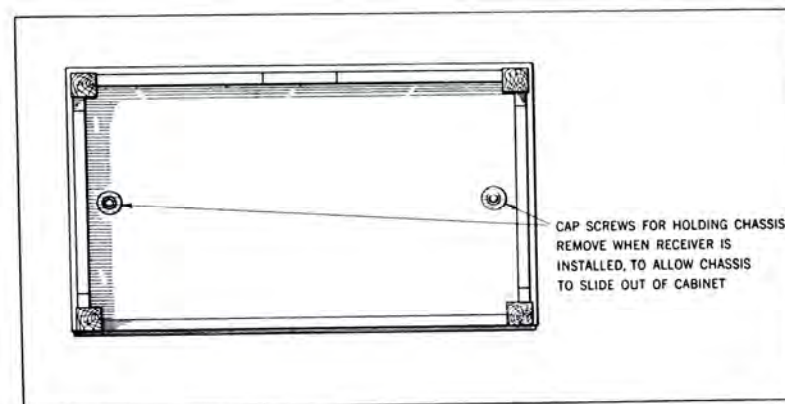


Fig. 6—Bottom View of Cabinet of No. 734 Receiver, showing Cap Screws to Anchor Chassis in place

The Unit is housed in the upper compartment of the console cabinet of the No. 734 Receiver. Once installed and operating quietly, it is never necessary to open this compartment except to replace rectifier tubes or to readjust the balancing potentiometer when a new UX-210 (Super-Power Output) tube is installed in the chassis. Special provisions are made to protect inexperienced persons from coming in contact with voltages above 200, when the No. 404 Socket-Power Unit is installed in the receiver cabinet. As an extra precaution it is necessary that the upper panel should be kept closed and locked shut with the locking screws provided. Moreover, it is possible for inexperienced persons to come in contact with 400-volts of direct current if allowed to meddle with the Socket-Power Unit while the receiver is operating. (See Fig. 7.)

§ 7—VACUUM TUBE REQUIREMENTS

The Stromberg-Carlson No. 734 Receiver requires a set of eleven Vacuum Tubes as follows:

- 5 R. C. A. Radiotrons UX-201-A or Cunningham CX-301-A Tubes.
- 1 R. C. A. Radiotron UX-200-A or Cunningham CX-300-A Tube.
- 1 R. C. A. Radiotron UX-210 or Cunningham CX-310 Tube.
- 2 R. C. A. Radiotrons UX-216-B or Cunningham CX-316-B Tubes.
- 2 R. C. A. No. 289881 Tungar Bulbs.

All eleven tubes are furnished with each receiver, but packed separately for safety in shipment.

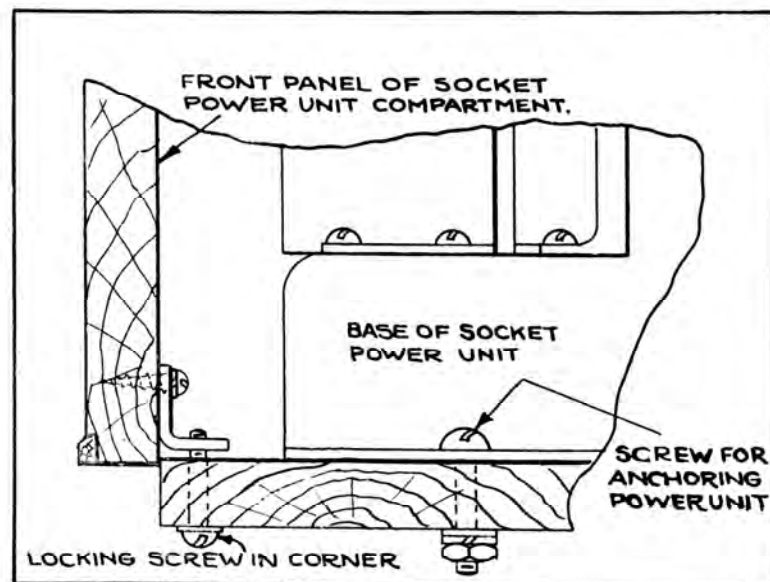


Fig. 7—Section View of lower front corner of Socket-Power Compartment, showing Screws to lock front Panel

One six-volt Miniature base Pilot or Panel Lamp (NEMA Standard) is also required for use as a pilot and panel light, this lamp being shipped already mounted in its socket.

The location of the various tubes in their proper sockets is shown in Fig. 16 and on the wiring diagram accompanying each receiver. Fig. 17 shows the location of the Panel Light, and also indicates how the socket for this light may be swung outward to facilitate installation or replacement of the lamp. After the Receiver is in operation this lamp should be adjusted by rotating the bracket support until the dial is properly illuminated. A friction spring employed in conjunction with the adjustable bracket will then keep the lamp in position.

The UX-200-A or CX-300-A type Detector tube recommended requires a "warming-up period" and may "hiss" for a minute or two after the Receiver is set in operation for the reception of radio programs. The detector tube is disconnected when the Receiver is reproducing phonograph music. Some people may prefer the use of a UX-201-A or CX-301-A tube as a detector, which does not require a warming-up period. This is not recommended, however, because the UX-201-A or CX-301-A tube is not nearly so sensitive a detector and is more likely to be microphonic and thereby a source of "acoustic coupling" than the UX-200-A tube which is recommended. (See Section 8.)

§ 8—HOW TO AVOID ACOUSTIC COUPLING

The internal elements of some vacuum tubes, especially when used for detector purposes, are sensitive to external jars or vibrations that may be transmitted through the air from a nearby loud speaker, resulting in a continuous low or a continuous high-pitched tone.

This action is called "Acoustic Coupling" and is accentuated when a powerful Cone type speaker is used and when the receiving set and loud speaker are both located in a critical position in a room that has practically all of the walls, floors and furnishings of hard non-resisting materials, which easily reflect sound. The presence of rugs or other floor coverings, drapes or other soft wall coverings, upholstered furniture, or even the presence of a number of people in the room, tends to prevent these sound reflections or echos, and besides reducing the possibilities of acoustic coupling, give naturalness to the reproduction in a loud speaker.

The Vacuum Tube Cap of the Detector radio shield is provided with prongs or fingers padded with felt to steady the detector tube against vibrations which will set up this microphonic action. Therefore, always be careful to place this special cap over the detector tube (front right-hand shielded compartment.)

If the loud speaker is provided with a long cord, such as those furnished on the Stromberg-Carlson No. 10 and No. 11 Cone type speakers (See Section 29) so as to be located a distance from the receiving set, it is usually possible to find a location where the acoustic coupling will be at a minimum or where no audible disturbing tone will be reproduced. Changing the location of the loud speaker only one or two feet from a position where acoustic coupling exists, often will completely overcome this disturbance. Moreover, rotation of the cone, even at a fixed short distance from the receiver, will often have a marked effect. It will ordinarily be found that acoustic coupling may be reduced by turning an edge rather than a face of the cone towards the receiving set.

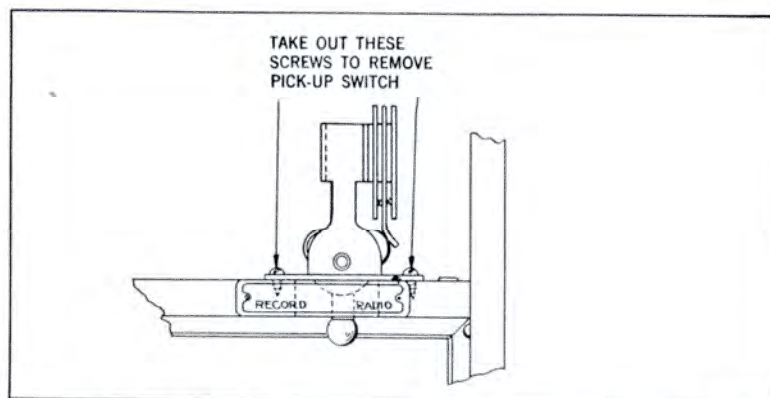


Fig. 8—Pick-up Switch mounted in place behind "Record"—"Radio" escutcheon. Switch must be removed to allow Socket-Power Unit to slide into its Compartment

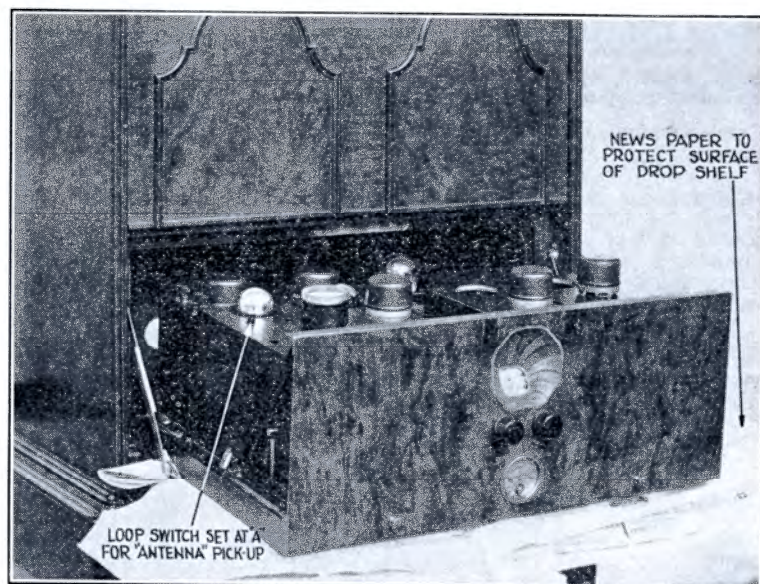


Fig. 9—Chassis drawn part way out of Cabinet, for convenience in making connections, switching from Antenna to Loop, or installing Vacuum Tubes

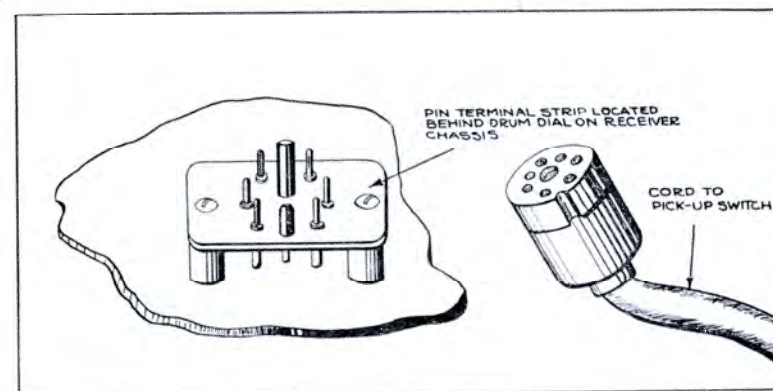


Fig. 10—Multiple Connector Plug of Pick-up Switch Cord, and Strip mounting Pin Terminals with which it makes contact

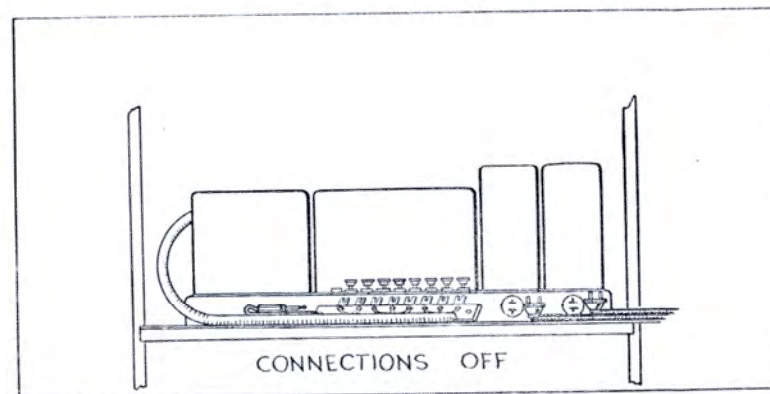


Fig. 11-A—Showing No. 404 Connections Off

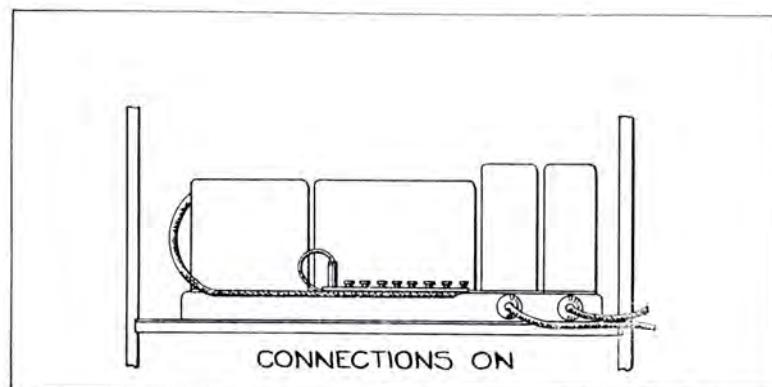


Fig. No. 11-B Sohwing No. 404 Connections On

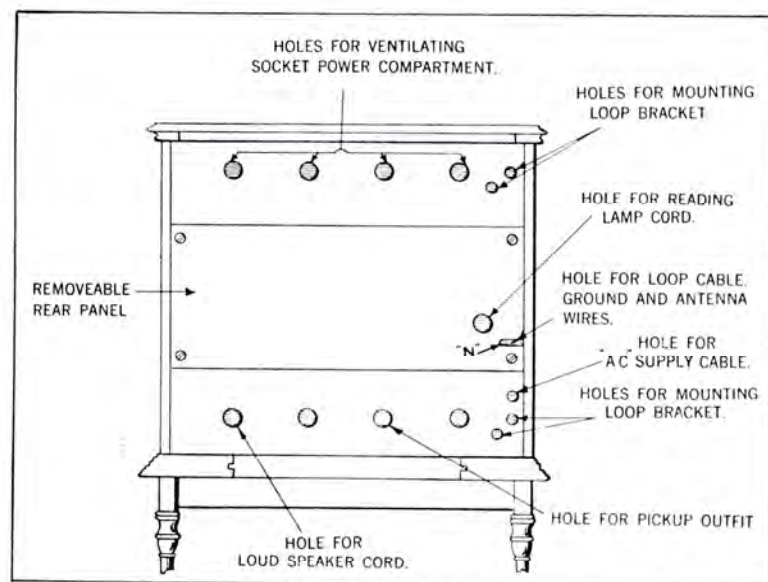


Fig. 12—Rear View of Cabinet of No. 734 Receiver

Never attempt to use a Loud Speaker mounted directly on top of the receiver cabinet, since vibrations will be transmitted to the vacuum tubes from a speaker in this position by the cabinet, as well as by sound waves in free space.

When making a test to overcome acoustic coupling be sure that the tube cover having the four inner spring fingers is placed over the detector tube (right-hand shielded compartment) and that the receiver chassis is completely pushed into the cabinet.

If none of these suggestions prove effective in overcoming acoustic coupling, the only recourse left is to have a dealer replace the detector tube with one less microphonic.

Some people prefer to use a UX-201-A or CX-301-A tube as a detector although this practice is not recommended. The 201-A type of tube is less sensitive as a detector than the 200-A type, and more likely to be microphonic. It does not require the three minute "warming-up period" of the super-sensitive detector tube, however, and a choice for the least microphonic of six tubes is available by trying each in turn in the detector socket. If a UX-201-A or CX-301-A tube is used to function as a detector, do not attempt to use the super-sensitive 200-A detector type of tube in any other stage, as the latter tube is designed only for use as a detector.

§ 9—SELECTION OF THE RADIO AMPLIFIER TUBES

For best results, good, sensitive, Radiotron UX-201-A or Cunningham CX-301-A tubes must be used in the radio amplifier sockets. (Fig. 15.) The selection of these tubes should be made with care. This selection can be made by tuning in a fairly weak broadcast signal and changing around the tubes suitable for use in these sockets, retuning the station SELECTOR for maximum signal each time a change of tubes is made until the best combination of tubes is found. Be sure to turn off the power before removing any tubes from their sockets to make a change. Always have the meter set at the red mark on the scale when making these tests.

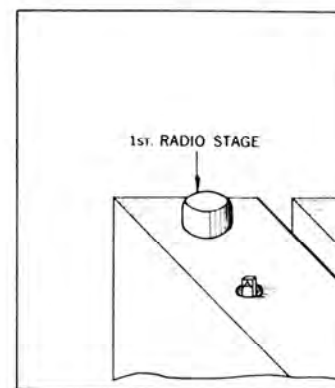


Fig. 13—Antenna-Loop Switch in position for Antenna Pick-up

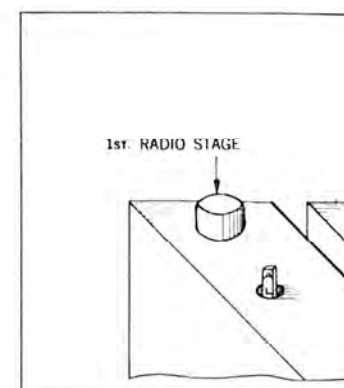


Fig. 14—Antenna-Loop Switch in position for Loop Pick-up

Once the best location for the tubes has been selected, it is a good plan to always leave them in the same sockets. Labeling all tubes in the receiver with the socket locations, will insure that they can be replaced in the same positions, if, at any future date they are removed for any reason. In selecting tubes, a defective tube may be located by having an extra tube on hand and successively exchanging with each tube in its socket until the defective one, if any, be located.

§ 10—REPLACEMENT OF VACUUM TUBES

In making any replacements, be sure to obtain genuine R. C. A. Radiotrons or Cunningham tubes of the "X" type. Moreover, in order to insure satisfactory operation, be sure to obtain genuine R. C. A. Tungar Bulbs, bearing the Stromberg-Carlson label on the carton, from an authorized Stromberg-Carlson dealer.

Before replacing any Vacuum Tubes turn off the current.

The filaments of the tubes in the Receiver Chassis (except the UX-210 Tube) are connected in series and, therefore, if one filament burns out, all will fail to light. It then becomes necessary to try a new tube in one socket after another with the other tubes all in place until the defective tube is located. Turn off the power each time, before withdrawing any tube from its socket, and leave it off until tubes are in place in all sockets.

To replace Vacuum Tubes located in the receiver, draw the chassis part-way out of the cabinet, protecting the Drop Shelf with newspaper as shown in Fig. 9. Remove the caps which shield the Vacuum Tubes and replace the tube in its socket. Be sure to have the locating pin on the base of the tube pointing in the direction of the arrow for that tube, as shown in Fig. 16. When the new tubes are in their sockets, replace the Vacuum Tube Caps in the shields, being careful to replace the cap with the four felt-padded spring fingers over the detector tube.

All vacuum tubes are fragile and must be handled with extreme care to prevent damage to the inner elements. The spacing of these elements is made close, in order to obtain electrical efficiency, and unless accidentally dropped or otherwise mechanically damaged, the accuracy of this spacing will be maintained indefinitely.

A slight displacement of the internal tube elements, that would not cause actual short circuiting of the plate to the grid or the grid to the filament, might decrease the electrical efficiency so that the receiver will not operate correctly. On the other hand, internal short circuits in the tubes may damage the receiver wiring or the Socket-Power Unit. Therefore, remove immediately from the receiver any tube which "flashes" or does not seem to be operating correctly and efficiently.

§ 11—USEFUL LIFE OF VACUUM TUBES

The Receiver Tubes (UX-200-A, UX-201A and UX-171) which are the vital part of the receiver, are the large sized five-volt Direct Current type; this being standard stock size of tried and proven worth and long active life characteristics.

The Rectifying Tubes used in the associated A. C. Socket-Power Unit (UX-216-B and the two No. 289881 Tungar Bulbs) are designs that insure many

thousand hours of uninterrupted service. The life of the tubes recommended for this receiver is from 1,000 to 4,000 hours of intermittent use, if not abused by rough handling and if not subjected to too high a filament current. Therefore, it is economy always to keep the meter pointer to the left of the red mark on the scale. Excessive filament current will not increase the signal strength any appreciable amount above the signal obtained when the tubes are worked within the safe limit specified, but on the other hand will greatly reduce the active life to a small fraction of that given above. For example, a 10% increase in filament current may cause as much as a 50% decrease in useful life of the tube.

The end of the useful life of the vacuum tubes is indicated by lack of sensitivity or a rattling noise in the cone speaker, rather than failure of the filament to light.

The two UX-216-B Rectifier Tubes supplement each other, as do also the two Tungar Bulbs, to supply full wave rectification of alternating current. If one Tungar Bulb or one UX-216-B Rectifier Tube burns out after many months of service, it is advisable to replace not only the burned-out bulb, but its mate as well. The active life of these bulbs is dependent upon the amount of use made of the receiving set, and their efficiency falls off to some extent with increasing age. If one bulb burns out after only a few weeks of service, it is all right to replace it and keep the other still in operation. If both bulbs, however, have been in service for many months and one burns out, the chances are that the other is practically worn out too and is operating at reduced efficiency. It is then recommended that both bulbs be replaced in order to have two more nearly matched bulbs in operation; a condition which will allow more satisfactory and quieter operation of

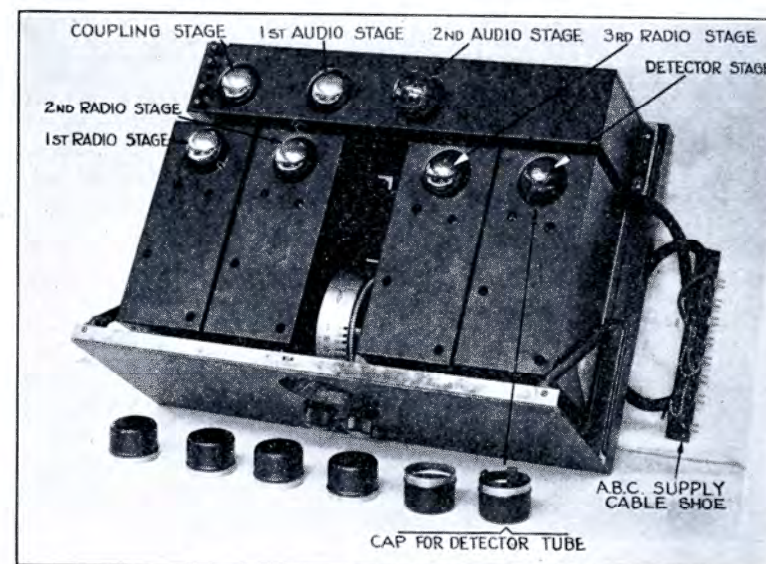


Fig. 15—Chassis of No. 734 Receiver

the receiving set than could be possible with one efficient and one less efficient rectifying tube.

§ 12—LOCATION OF RADIO RECEIVER

The No. 734 Radio Receiver can be located in any convenient position in any room in a building. When there is a choice of several positions, it is best to select a location that will favor the easy pick-up of the broadcasting station signal.

If an outdoor antenna and a ground connection are used for the radio receiver pick-up, it is advisable to favor a location as close to the point where the antenna enters the building as possible. Thus, the signal collector will be in a favorable position to pick-up broadcasting signals and only a short length of antenna or lead-in wire will be located inside the building to be exposed to local electrical noises.

If the No. 734 Receiver is used with a loop type of pick-up, care must be taken to select a position in the room where the loop will not be shielded from the broadcasting station signal by metal lathing in the walls, concealed pipes, radiators, etc. The best location for a loop type of pick-up is determined by experiment, testing the reception of the desired broadcasting signals with the receiver in various positions in the room. Usually a position near a window opening gives best results. (See Section 21 on "Operating the No. 734 Receiver with a Loop.")

The intelligent location and correct installation of an antenna type of signal collector, to fit the local pick-up conditions and the amount of amplification provided in the receiver, will insure operating satisfaction. There-

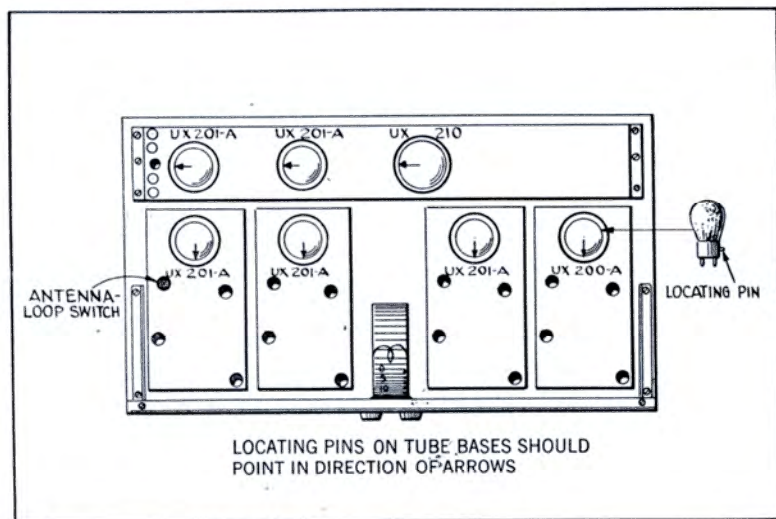


Fig. 16—Location of Vacuum Tubes in Chassis

fore, this subject of antennas is treated in detail in the following articles. There are locations where it is not possible to install an efficient antenna and where nothing but local or medium distant stations can be picked-up, due to congestion of local programs. Here it may be found that a loop type of signal collector will give more satisfactory service than an inside antenna or an unfavorably located antenna. Instructions for the installation and operation of a loop type of pick-up on the No. 734 Receiver follow the instructions covering antennas. (See Sections 20 to 23 inclusive.)

§ 13—CHOICE OF ANTENNA AND LOCATION

The No. 734 Radio Receiver is designed for antenna or loop operation, so as to fit all local receiving conditions. The single wire antenna is the most efficient type of pick-up device and should be used wherever possible, as it will allow for greater amplification of a weak or distant signal and being non-directional, it does not require any manipulation when selecting broadcasting station programs.

There are locations, however, where it is not convenient to install an outside antenna, or where an inside antenna wire will be shielded from the desired broadcast signal by its closeness to the metalwork in the building walls. In such cases, a loop type of pick-up that is located away from

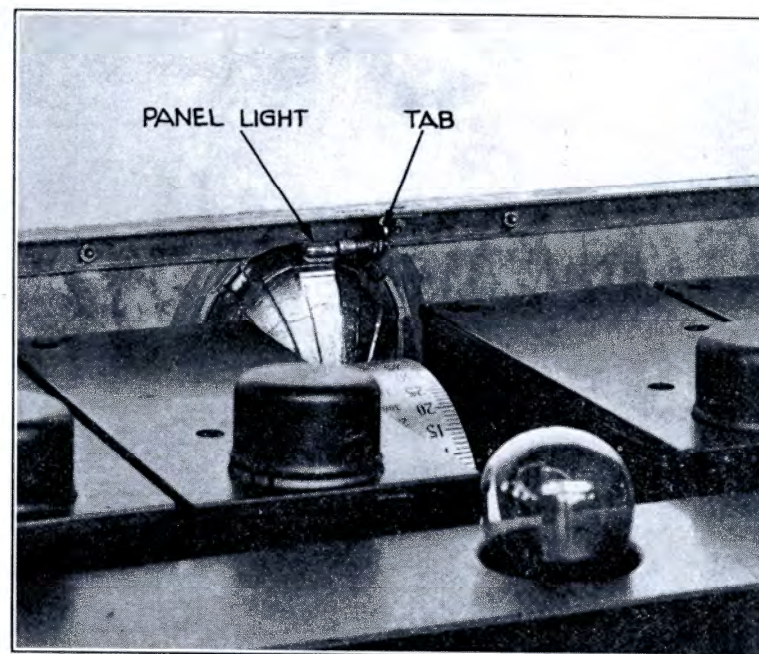


Fig. 17—Panel Light to illuminate Dial of Chassis

metal in the walls usually will be more satisfactory and can be employed on the No. 734 Receiver as subsequently described in Sections 20 to 23.

The employing of three stages of tuned radio frequency amplification in the No. 734 Receiver allows the antenna to be comparatively short and of single wire construction. By a short antenna, we mean one of from 20 to 50 feet total length, from the end of the antenna to the radio receiver, provided the lead-in is not shielded by steel buildings or metal roofs. When a long antenna is referred to, one of 50 to 70 feet total length is meant.

An antenna should be at least 15 feet and preferably higher, above a metal roof or steel frame building. If lower than this or shielded by steel building, a greater length may be necessary to secure ample signal volume.

It should always be borne in mind, particularly in cities where there are a number of broadcasting stations, that a short antenna will give much better selectivity than a long antenna, and if properly located in an unshielded position, will give a good volume and distance.

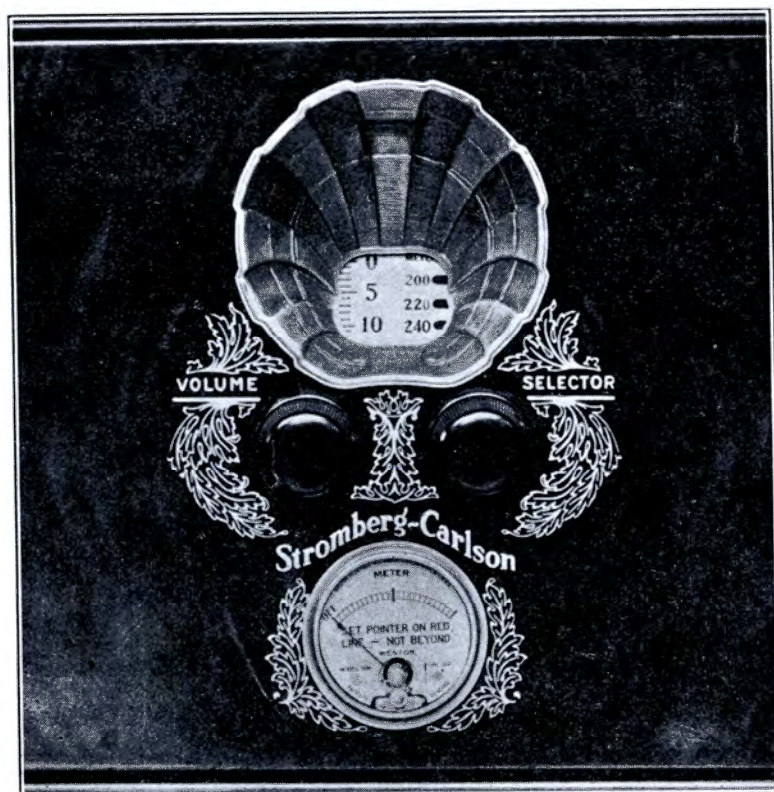


Fig. 18—Controls used in reception of radio programs

The choice of the antenna length varies with the location of the receiving set and the conditions encountered:

- (a) If the receiver is located in a district where there are a number of nearby broadcasting stations, it is best to use a comparatively small antenna (20 to 50 feet) in order to get maximum selectivity.
- (b) If the receiver is located where there are a very few or no local broadcasting stations, it is permissible and desirable to use a longer antenna (not over 80 feet total length) in order to take advantage of the louder signals and greater distances obtained.

The choice of the location for the antenna also regulates the length or size:

- (a) If the antenna is to be located inside a house or building and is not shielded by steel framework, metal lathing or metal roofing, then a short wire of not more than 20 or 50 feet long can be used for installation convenience and for maximum selectivity.
- (b) If the walls or roof of the building in which an inside antenna is to be installed contains metal, then the "pick-up" wire must be long and kept away from the walls adjacent to where the antenna is supported.
- (c) Where the building is shielded, as described in the previous paragraph, and local electrical (static) noises are generated inside the building by motors, or other electrical apparatus, it is best to use an outdoor antenna with as short a length of lead-in wire inside the building as possible. This cuts down the effect of the inside disturbing noises and allows ample pick-up for distant signals.

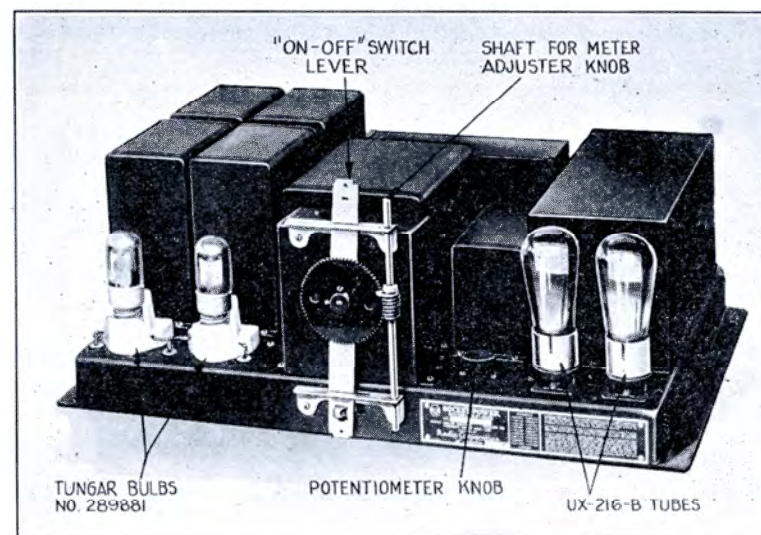


Fig. 19—The No. 404 Socket-Power Unit.

When the receiving set owner desires to be in position to take advantage of both the short and the long types of antennas, a single pole, double throw switch can be installed at some convenient point between these two antennas and the wire leading to the radio receiver as shown in Fig. 22. Under normal conditions, the receiver can be left connected to the short antenna and only when extreme distant stations are desired, or the receiving conditions are unfavorable need this switch lever be thrown to the long antenna. If an outdoor antenna is to be installed by the owner of the radio receiver, it is best to become acquainted with the section of the "National Electrical Code" dealing with radio receiving set installations, so as to comply with the rulings. These rulings do not include the installation of a radio receiver when all of the wiring of antenna and ground is located within the building.

§ 14—OUTDOOR ANTENNA ON RIGID SUPPORTS

If it is desired that an outdoor antenna is to be used, there are four important precautions to be observed:

- First**—See that the antenna wire is not placed over or under any other wires, such as electric light, telephone or telegraph wires. This is to avoid contact between antenna wire and one of the other wires, if a wire should break loose and fall. These other circuit wires may carry dangerous electric voltages.
- Second**—Select firm supports for both ends of the antenna wire and make sure that the fastening of the antenna to the supports is sufficiently secure to withstand high winds and heavy sleet if located in a cold country.
- Third**—Use a protector (lightning arrester) that is approved by the "National Electric Code" and see that it is correctly installed and connected to an approved "ground."

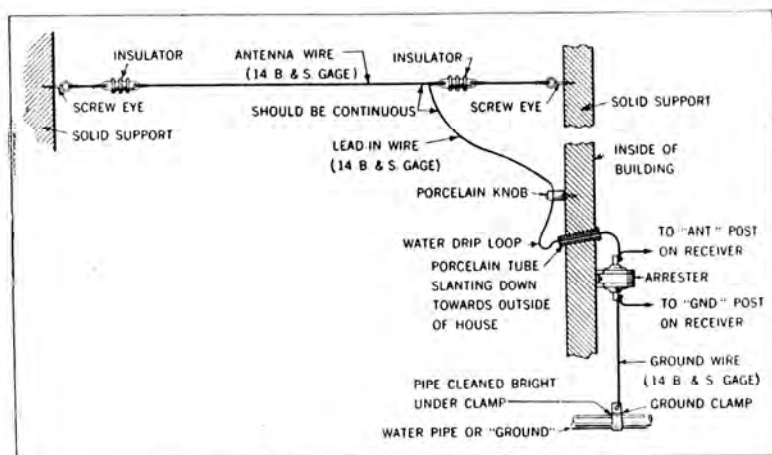


Fig. 20—Outdoor Antenna on rigid supports

Fourth—Be sure that the antenna and lead-in wires are well insulated from the supports and from all foliage or limbs of trees and that these wires do not run close to conducting objects, such as metal pipes, metal roofs, metal water spouts, etc.

The following is a list of materials suggested for an outdoor type of antenna, such as will be suitable for use with the No. 734 Radio Receiver. (Stromberg-Carlson No. 2 Antenna Outfit or equivalent):

- 100 ft. No. 14 B. & S. Gauge Enameled Copper Antenna Wire.
- 50 ft. No. 14 B. & S. Gauge Rubber Covered and Braided Copper Wire, for lead-in and ground connection.
- 25 ft. No. 18 B. & S. Gauge (or larger cross section) Rubber Covered and Braided Copper Wire (single conductor lamp cord will do) for connecting the receiving set to the arrester.
- 2 Antenna Strain Insulators of Glazed High Grade Porcelain or "Pyrex" Glass.
- 3 Split Porcelain Knobs with screws, for fastening lead-in wire to side of building.
- 1 Approved Ground Clamp, for attaching the ground wire to a water pipe or other suitable ground connection.

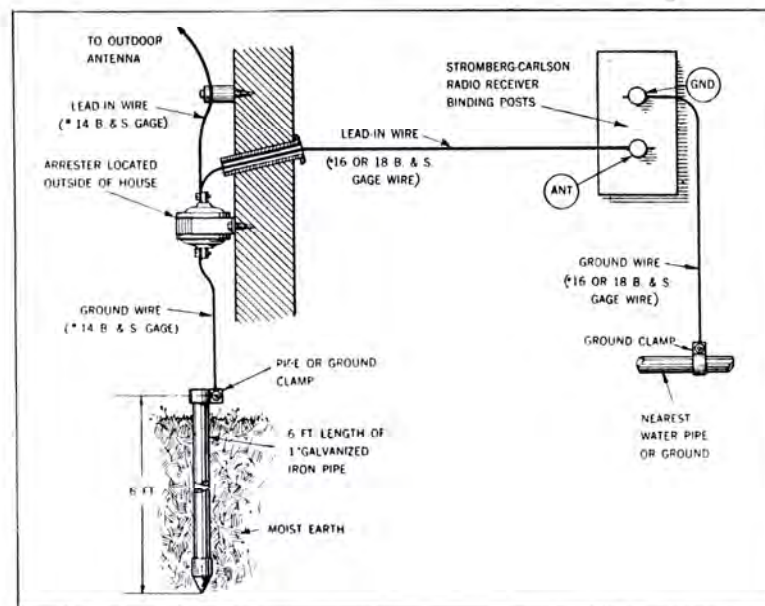


Fig. 21—Separate Grounds for Arrester and Receiver. Used when an outside Antenna is employed and the Receiver is located at a distance from the Arrester, also when the Arrester is located outside the building

- 1 Porcelain Tube, 8 inches long by 9-16 inch outside diameter, for insulating the lead-in wire when it passes through wall of building.
- 1 Protector (Lightning Arrester of "Underwriters" approved design.
- 2 Large Screw Eyes, for fastening ends of antenna to supports.
- 12 Insulated Staples, for attaching inside wire to woodwork.

The installation of an outdoor antenna, mounted on rigid supports, can proceed in the following order, as shown in Fig. 20.

- (a) The large screw eyes for holding the antenna wire can be screwed into the supports so as to give a separation of between 30 and 50 feet. The height of these screw eyes will determine the antenna wire height, which should be ample to clear obstructions, say between 20 and 40 feet above the earth or 10 to 20 feet above the roof of a building.
- (b) Now cut two short pieces (about 3 feet long) from the end of the coil of antenna wire for fastening the strain insulators to the screw eye supports. Secure one end of each piece of this wire to an insulator by passing it through the hole or eye in the insulator

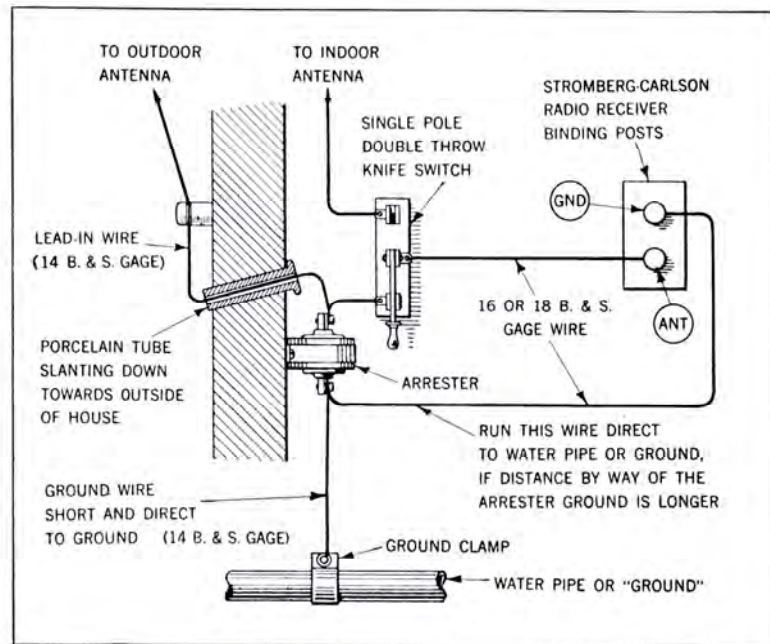


Fig. 22—Inside Ground for Arrester and Receiver, used when both Arrester and Ground are located close together. This allows a long outdoor or a short indoor Antenna to be used as desired

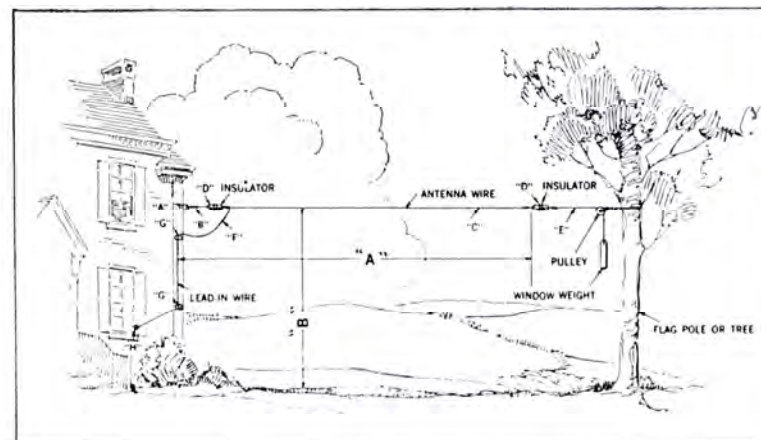


Fig. 23—Typical Installation of an outdoor Antenna, when one of the supports is flexible. Length "A" plus height "B" should not exceed 80 feet.

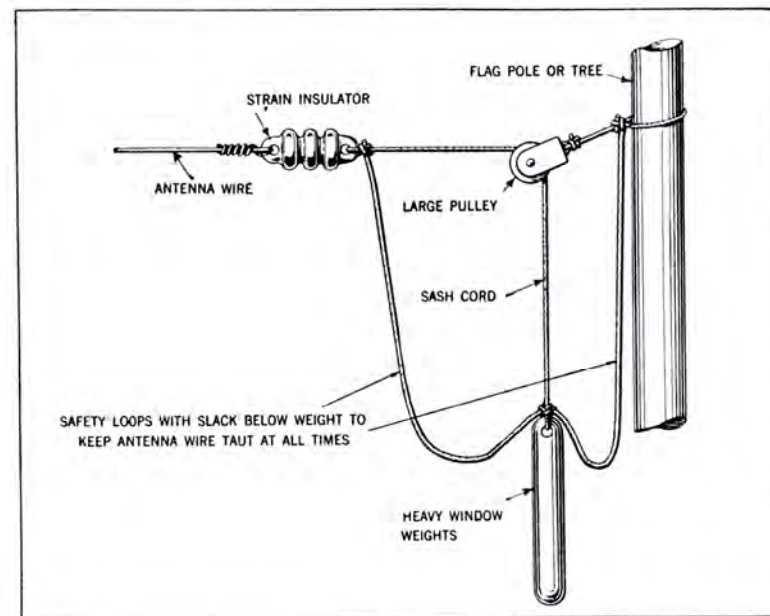


Fig. 24—Window Sash Weight for keeping slack out of Antenna Wire when one of the supports is flexible.

and then twisting the wire tightly around itself for five or six turns, as shown in Fig. 20. The other end of each of these wires is inserted through the holes in the screw eyes and twisted tightly around itself for five or six turns, thus making the insulators secure to the supports.

- (c) The remaining antenna wire is to be fastened between the two strain insulators so as not to come in contact with the two short supporting wires mentioned in the previous paragraph. This is best done by first passing the end of the antenna wire that is to be farthest from the receiving set, through the unoccupied hole in the strain insulator and then to twist tightly around itself five or six turns.
- (d) The other end of the antenna wire is passed through the unoccupied hole of the second strain insulator (the one nearest receiving set location) and twisted tightly around itself for five or six turns, after the antenna wire is drawn up taut. This should leave a piece of antenna wire already attached to the antenna proper and sufficiently long to serve as a lead-in wire to the protector location.
- (e) The lead-in wire (extension of the antenna wire) should be run to the point where it is to enter the building without touching metal work or even the woodwork. Use one or more of the split porcelain knobs for providing this insulation from the building and the 8-inch porcelain tube to insulate the opening through which the wire enters the building.

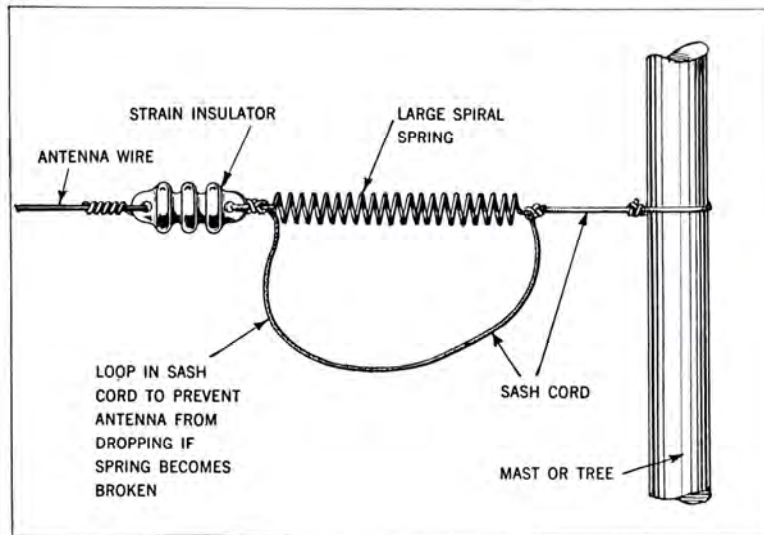


Fig. 25—A Special Spring for keeping slack out of Antenna Wire when one support is flexible.

- (f) The hole for this porcelain tube can be bored with a 5-8 inch diameter bit through the woodwork of the wall or window frame. When boring this hole, have the bit slant downward towards the outside of the building. This will prevent rain from entering through the bushing. Insert the bushing through this slanting hole with the large end of the bushing inside the building to keep it in place.
- (g) The lead-in wire should be fastened to the outside wall or window frame, a few inches above the outer end of the porcelain tube, with one of the split porcelain knobs. This will allow the lead-in wire to be looped down below the outer end of the porcelain tube and serve as a water "drip loop" and carry rain away from the tube end.
- (h) The protector is best located inside the building, immediately below the inner end of the porcelain tube, as shown in Fig. 20, so that the lead-in wire can be fastened directly to the top binding post of the arrester. The "National Electrical Code" requires that the

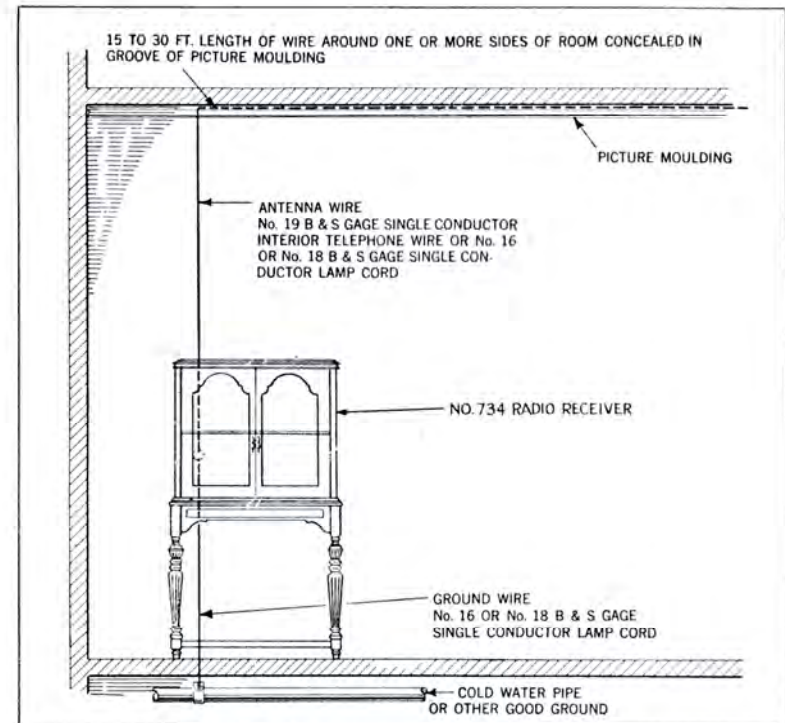


Fig. 26—Picture Moulding Antenna. Used when the room is not shielded by metal framework or metal lathing.

protector "shall not be placed in the immediate vicinity of easily ignitable stuff, or where exposed to inflammable gasses or dust or flyings of combustible materials."

- (i) The protector ground connection should be made with the No. 14 B. & S. gauge rubber covered and braided copper wire. (It must not be smaller conductor than the lead-in wire.) Cut and scrape the insulation from one end of this wire and fasten it to the lower unused binding post of the protector and run this wire by the most direct and shortest route to a good reliable ground. If there is a cold water pipe nearby, it will serve as a good ground, the connection to the pipe being made with the ground clamp. **Be sure to scrape all paint or bronze enamel from the metal of the pipe at the point where the ground clamp is to be located.** Set the clamp screw tight enough so that it will be impossible to twist the clamp on the pipe by hand. Cut the ground wire the right length to just reach the ground clamp and fasten its bared end securely under the nut of the clamp screw.

Other protector grounds permitted by the "National Electrical Code" are steel frames of buildings or other grounded metal work in the building, and artificial grounds, such as driven pipes and rods, as shown in Fig. 21, plates, cones, etc., located in moist earth. The use of gas pipe as a ground is prohibited by the "National Electrical Code."

- (j) The connection from the protector to the No. 734 Radio Receiver can be made with the No. 16 B. & S. gauge rubber covered and braided copper wire (single conductor lamp cord will do.) The distance from the protector to the receiver should be kept as short as possible. Remove the insulation from one end of the No. 16 wire and fasten securely to the same binding post of the protector that the lead-in wire is fastened (upper post.) Connect the other end of the No. 16 B. & S. gauge wire (insulation removed) to the "ANT" binding post of the radio receiver.
- (k) A second piece of the No. 16 B. & S. gauge rubber covered and braided copper wire should be used to connect the ground (GND) binding post of radio receiver with the binding post of the protector to which the protector ground wire is fastened, as shown in Fig. 20. This second wire should be kept separated from the first or antenna connecting wire by a distance of several inches for the entire length from the receiving set to protector. If a cold water pipe or other grounded metal work is close to the receiving set, it is advisable to run the ground wire by this shorter route to ground, as shown in Fig. 21, rather than by way of the protector ground wire.
- (l) The antenna installation just described has all joints between different wires made at the binding posts on the protector. If the lead-in wire is not a continuation of the antenna wire, it should be securely fastened by wrapping tightly around the antenna wire and soldered.
- (m) In some cases it is not permissible to drill a hole through the side of a building or window for the porcelain tube used for the lead-in wire. Heavily insulated approved "window strips" have been used for this purpose with success. These strips are designed to be placed flat on the window sill and the window closed down, without damaging the insulation of the strip, provided the window

fits its frame not too tightly. A tightly fitting window or a window having metal weather strips will interfere with making a good installation. Window strips should never be used where grounded metal sash or grounded metal window frames are encountered.

- (n) Another (temporary) scheme for bringing the antenna into a building is to place a narrow wooden strip between a raised sash and the bottom of the window frame and in this wooden strip to insert the porcelain bushing for the lead-in wire.

If the radio receiver owner wishes to obtain the advantages of both the short and the long antennas, the two types can be installed, the long antenna being an outdoor type and the short antenna the indoor type, using a single pole, double-throw baby knife switch, to connect either antenna to the radio receiver as desired. The correct wiring of this switch is shown in Fig. 22.

§ 15—OUTDOOR ANTENNA ON FLEXIBLE SUPPORTS

If the outdoor antenna is to be attached to a tree or other support that can sway with the wind, the fastening should be made flexible, so as to hold the horizontal wire taut and yet remove undue strain from the wire itself. One satisfactory way to do this is by means of a counter-weighted cord operating over a suitable pulley as shown in Figs. 23 and 24, the material required being as follows:

1 Galvanized Iron or Brass Pulley 2 inches or 3 inches diameter with pulley groove of size suitable for a window sash cord.

50 ft. hard-woven cotton window sash cord.

1 Window Sash Weight (heavy weight as used on large windows).

The receiving set end of the antenna can be rigidly supported and the lead-in wire run as shown in Fig. 21 or 22, and as described in Section 14, "Outdoor Antenna on Rigid Supports."

The open end of the antenna wire (nearest the tree or flexible support) should be attached to the strain insulator by passing it through the opening in the insulator, doubling back and wrapping tightly around itself five or six times as shown in Fig. 24.

Now, one end of the sash cord should be passed through the remaining hole in the strain insulator and securely tied, after which this cord can be threaded over the pulley wheel and the pulley frame fastened to the tree or other flexible support, using a piece of antenna wire for this fastening. One heavy window sash weight should be attached to the free end of this antenna supporting cord, as shown in Fig. 24, the amount of weight being sufficient to hold the horizontal antenna wire taut.

When a tree is used as a support for an antenna, be sure that none of the limbs of the tree can swing with the wind and touch the horizontal antenna wire. It is best to have the sash cord support extend 8 or 10 feet outside the foliage of the tree in order to assure ample separation between the end of the antenna wire and the leaves or limbs of the tree.

When this arrangement is correctly installed, the swaying of the tree or flexible support will cause the weight to be raised and lowered while the antenna wire will remain practically horizontal and no undue strains be placed on the wire or its supports.

Another flexible fastening to a movable support is illustrated in Fig. 25. Here, a long spiral spring of rust-proof metal is inserted between the flexible support and the antenna strain insulator, with a loop of sash cord to act as a safety fastening for holding the antenna wire from dropping in case the spring should be accidentally broken. The spring should be of sufficient strength to hold the antenna wire from undue sagging or swaying in a heavy wind.

§ 16—PICTURE MOULDING ANTENNA

When the installation of the No. 734 Radio Receiver must be confined to the one room or a small apartment, good results may be obtained by the use of an antenna placed around the picture moulding, provided the outer walls of the building are not of metal or metal lathed or the building of steel frame construction and there are no disturbing electrical noises generated inside the building. (See Sections 26 and 27.) Single conductor rubber covered and braided interior telephone wire (No. 19 B. & S. gauge) or single conductor lamp cord (No. 18 B. & S. gauge) will be suitable for this type of antenna.

When selecting the location for the radio receiver, preference should be given a position at one end or corner of a long room or hall, in order to get the maximum "effective length" of antenna.

The bare end of the single conductor rubber covered antenna wire should go through the slot "N" provided in the back of the receiver cabinet (Fig. 12) and be attached to the binding post marked "ANT," the free end of the wire running up to and around the picture moulding, as shown in Fig. 26. Small pins or staples can be used to hold this wire concealed in the groove in the picture moulding. This type of antenna can be carried along the picture moulding to the diagonal opposite corner of the room, or carried completely around the four sides of the room.

Never allow excess length of antenna or other external wiring to be stored inside the receiver cabinet. Always have these wires run straight from the binding posts to the holes in the rear of the cabinet. Avoid running the antenna wire close to other electric wires or close to metal electric lighting fixtures as losses in signal strength or the introduction of interfering noises may result.

The type of wire for connecting the ground binding post (marked GND) of the receiver to the nearest cold water pipe can be the same as that used for the picture moulding antenna. Use a good ground clamp for attaching this ground wire to the water pipe, being sure to scrape all paint, enamel or rust from the pipe before attaching the clamp. Any joints in the antenna or ground wires should be soldered, if possible, thus insuring a permanent job.

It is advisable to tag or otherwise mark the antenna wire and the ground wire, adjacent to the receiver location, so that if these wires are disconnected at any time, they can be correctly replaced. In some installations, the usual ground connection to pipes or radiators may act to pick up local electrical disturbances and produce "noise" in the loud speaker. A counterpoise ground, as described in Section 19, often will overcome this objectionable noise pick-up.

§ 17—ATTIC ANTENNA

The No. 734 Radio Receiver will give excellent results for distance and selectivity with an attic antenna of two parallel horizontal wires, between 15 and 20 feet long, spaced about 2 feet apart, as illustrated in Fig. 27, providing these wires are not located under a grounded metal roof. This antenna wire can be regular No. 19 B. & S. gauge interior telephone wire or copper wire of larger cross section.

Porcelain knobs can be used at each end of these horizontal antenna wires for support, care being taken that these wires do not come close to metal pipes or electric light wires.

The ends of these two horizontal wires, directly above the place where the radio receiver is to be located, should be connected together with a piece of No. 19 B. & S. gauge interior telephone wire, or other rubber covered and braided wire, and this wire carried directly down to the receiving set. All joints in the wire should be soldered for permanency.

It is best to keep this wire connecting the antenna to the receiver, inside the house, so that no protector (Lightning Arrester) will be required. An

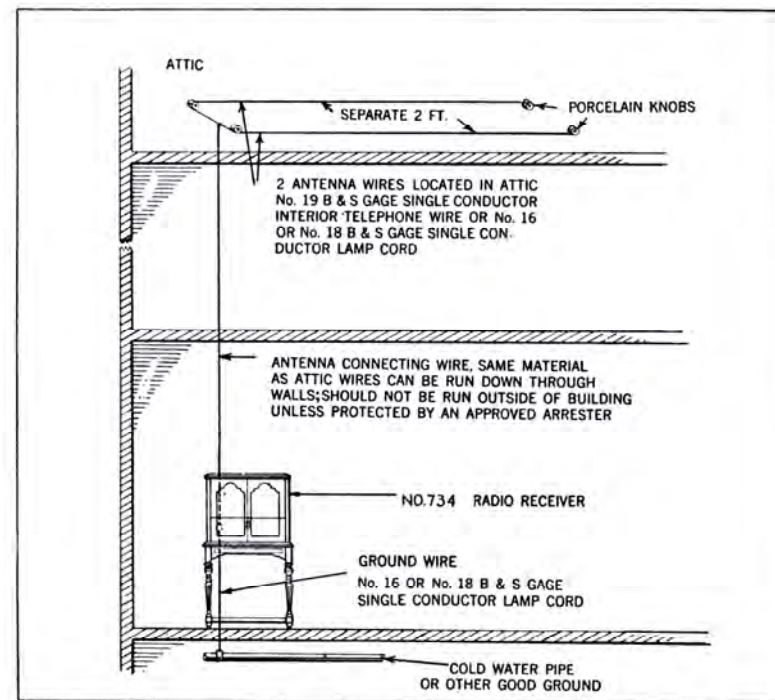


Fig. 27—Attic Antenna. Used where the roof of the building is not covered with metalwork.

electrician can make a neat installation by carrying this wire down through walls and thus be completely concealed. In no case should the wire be run through a metal pipe or metal conduit, although non-metallic "loom" will serve as extra insulation and is advisable. A wall receptacle and attachment plug can be used where this antenna connecting wire comes through the wall to the room in which the receiving set is to be located.

The radio receiver should be placed as close as convenient to the point where this antenna connecting wire enters the room.

The ground connection from the GND binding post to the radio receiver should be made to the nearest cold water pipe or other grounded metal part of the building, as described in Section 18, or a counterpoise ground installed. (See Section 19.)

If the available attic space is 30 or 40 feet long, a single horizontal wire antenna can be used in place of the two parallel wires. Porcelain knob insulators can be used at each end and one in the middle, if required to keep the wire from sagging. The remainder of the installation should be just as described for the two-wire attic antenna.

In place of a single or double wire attic antenna, this No. 734 Receiver will operate satisfactorily with a "pick-up" made from a piece of copper

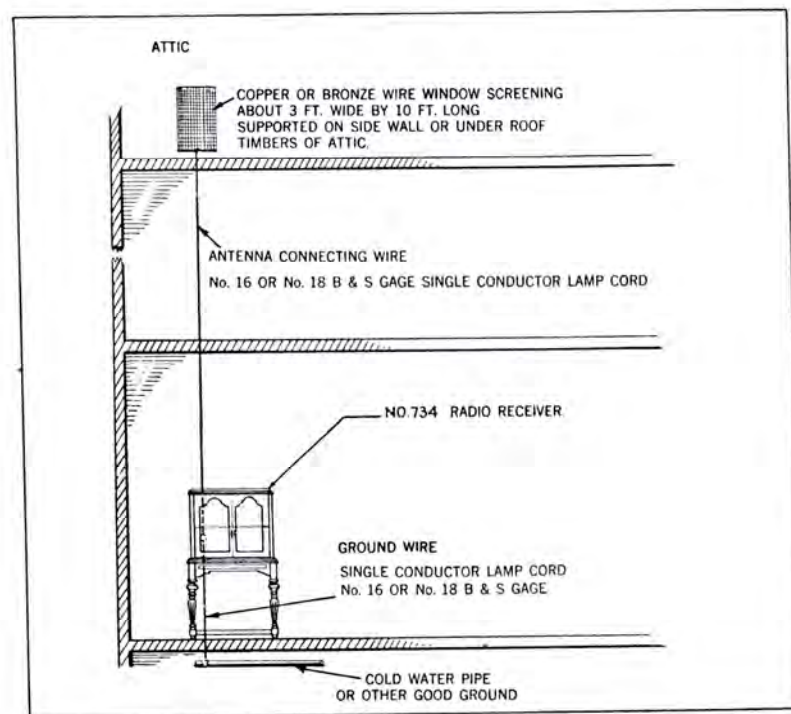


Fig. 28—Attic Antenna, using window screening for Pick-up.

or bronze wire window screening about 3 feet by 10 feet, arranged as shown in Fig. 28. It is advisable to solder a bare copper wire along the bottom of this screening and to this bare wire attach and solder the wire leading down to the radio receiver.

§ 18—GROUND CONNECTION FOR RADIO RECEIVERS

A good ground connection is essential to obtain the best results from the No. 734 Radio Receiver, therefore, this part of the installation should not be neglected.

If a cold water pipe is near the receiver location, it will serve as an excellent ground, the connection to the pipe being made through an approved ground clamp, as shown in Fig. 22. Be sure to scrape the metal surface of the pipe bright at the place where the clamp is applied to insure a reliable electrical connection.

Steel framework of buildings can be used for a radio receiver ground, but it is not highly desirable.

Heating system radiators can be used for receiving set ground connections, where no other connections are available, but seldom are efficient due to the high resistance joints between the radiator and the earth (ground) and may act as collector of electrical "noises." (See Section 27.)

Where none of the above ground connections are available, a good ground can be provided by driving a 6 ft. telephone ground rod or a 6 ft. length of galvanized iron water pipe into earth that will remain moist the year around. See Fig. 21 for such a ground, which in this case is used for connecting to an outdoor antenna arrester.

A receiving set ground should never be made to electric light conduit, as high resistance joints prevent obtaining a good circuit to earth and electrical "noise" pick-up can be expected.

A gas pipe should not be used as a radio receiver ground, as it has insulating joints placed between the gas jets and the point where the pipe enters the earth (ground). For this reason, the "National Electrical Code" prohibits the use of a gas pipe for an arrester ground connection.

The use of a common ground connection for the radio receiver and the arrester, as shown in Fig. 22, is not objectionable, provided a shorter and more convenient connection to a good ground is not available as illustrated in Fig. 21.

§ 19—USE OF A COUNTERPOISE GROUND

When the No. 734 Receiver is located in such a position that a good ground connection, free from local "noise" pick-up is not possible, then the next best scheme is the use of what is known as a "counterpoise." This is merely a length of insulated wire, such as No. 14 B. & S. gauge rubber covered and braided copper wire, connected to the "GND" binding post of the receiver and stretched along the floor of the room or down a hallway for 30 feet or longer, as indicated in Fig. 29. This wire should not be connected to any metallic objects and the antenna should be any one of the types described in this instruction book.

§ 20—INSTALLING A LOOP ON NO. 734 RECEIVER

In order to adapt the No. 734 Receiver for loop operation, a Stromberg-Carlson No. 102 Loop will be required. This loop comes complete with supporting bracket and connecting cable and is easily installed as follows:

First—The loop supporting bracket should be attached to the lower rear side of the cabinet with the two cap screws provided for this purpose. Holes "R" and "S" shown in Fig. 12 are provided for these two cap screws and a metal screw-plate comes already mounted inside of the receiver cabinets into which these screws will thread. Use a standard automobile type socket wrench for $\frac{1}{2}$ inch hexagonal heads or a Stevens "Spintite" No. 8 Socket Wrench for tightening these bracket mounting screws.

Second—After mounting the loop supporting bracket, the loop can be set in place in the socket, provided in the end of this bracket, by first threading the loop connecting cable down through the socket opening. Fig. 30 shows the loop mounted on the No. 734 Receiver all ready for operation while Fig. 31 shows the mounting on No. 734 Receiver folded back out of the way.

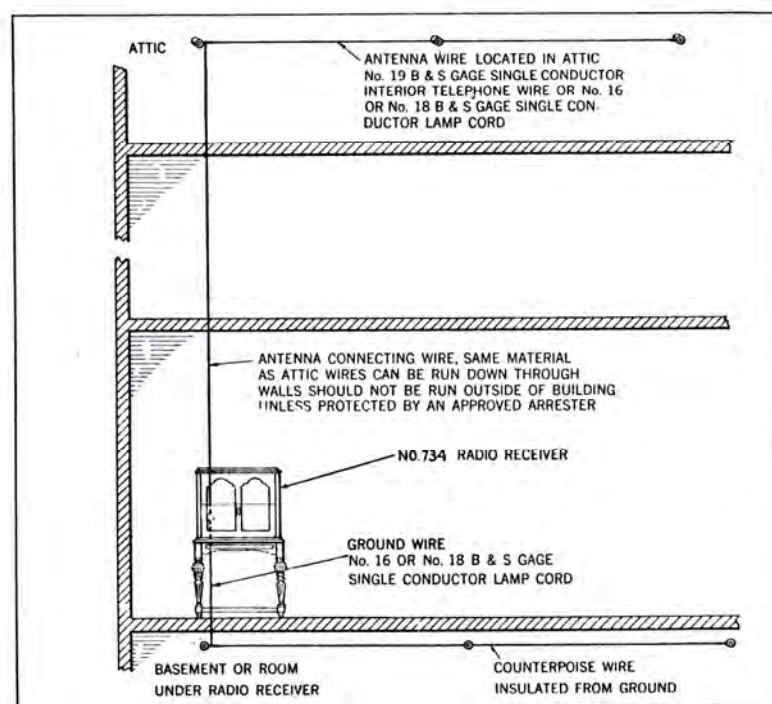


Fig. 29—A Counterpoise Wire used in place of a "Ground." Recommended for locations where the usual Ground collects "Electrical Noises."

Third—The loop connecting cable now should be threaded through the opening "N" (Fig. 12), provided in the back panel of the cabinet and the three conductors attached to the chassis binding posts. The wires are plainly labeled and are color-coded as follows:

Black Loop wire, connect to binding post marked "GND."
Black and Blue wire, connect to binding post marked "LOOP-2."

Blue wire, connect to binding post marked "LOOP-1."

The binding post marked "ANT" is not used. A ground wire should be used, being connected to the same post as the black Loop wire.

Fourth—The No. 734 Receiver circuit is converted for loop operation by merely pulling up the black switch handle, projecting through the top of the left hand shield (Fig. 16) to the position where the letter "L" is fully exposed. (When this same handle is depressed so that the letter "A" only is exposed, the receiver is arranged for antenna operation.) (See Figs. 13 and 14.)

§ 21—OPERATING NO. 734 RECEIVER WITH A LOOP

All of the installing and operating instructions contained in this book apply to the loop equipped No. 734 Radio Receiver.

The best location of a loop receiver for picking up broadcasting station signals is dependent on local conditions, such as the presence of large metal surfaces, radiators, piping, metal lath or wiring in the walls of the building that may absorb some of the energy of the radio waves. Thus, it is advisable to determine the best location by comparing the operation of the loop equipped receiver in different parts of the room.

Usually the best results are obtained when the receiver is located near a window or closer to the outside walls of the building than the inner walls. Under normal conditions there are two positions of the loop at which the signal strength will rise to maximum for each transmitting station, also two other positions at right angles where the signal will be at a minimum. If the desired stations are not heard when tuning the station selector, then rotate the loop a quarter of a turn from its former position and repeat the tuning operation.

In some cases, this selectivity of the loop can be used to advantage in cutting out an undesired local or powerful broadcasting station, or a local electrical disturbance and still bring in a desired station. The loop should be rotated to the position where the best results are secured, endeavoring to locate the position where the interference does not come in, but the desired signals do.

It is obvious from the foregoing that the rotated position of the loop can be used as a second means for reducing the volume of signal in the loud speaker, thus one or both of the following methods can be used:

- By using the volume control knob.
- By rotating the loop to the best position for the desired volume of signal.



Fig. 30—No. 734 Receiver with No. 102 Envelope Type Loop swung out for operation.



Fig. 31—No. 734 Receiver with No. 102 Envelope Loop folded back against cabinet to be out of the way when not in operation.

§ 22—INSTALLATION FOR BOTH ANTENNA AND LOOP

The loop switch, located in the 1st radio amplifier shielded compartment, is so wired that either an antenna or a loop can be connected to the receiver circuit as desired, but in no case can both of these collector systems be connected at the same time.

This makes it possible to permanently connect an antenna wire to the "ANT" binding post and a ground connecting wire to the "GND" binding post and at the same time install a loop as previously described in Section 20 and as shown in Fig. 32. Now, by merely setting the switch handle to "L" as shown in Fig. 14 or to "A" as shown in Fig. 13, the loop or the antenna are connected to the receiver as desired.

When these two collector systems are both wired to the binding posts of the receiver, it will be found that the loop may act different than when no antenna or ground wires are installed. In other words, one side of the loop may be more strongly directional than the other side and instead of revolving the loop one-half a revolution (180°) for obtaining maximum pick-up, it may be necessary to revolve the loop nearly a complete revolution (360°) to locate the position for maximum signal.

The operation of the No. 734 Receiver when wired for both loop and antenna systems, but with the loop switch set at "A" (Fig. 13) for antenna operation, follow the instructions given in this book for receivers equipped with antenna only. In this case, the presence of the loop does not interfere or modify the action of the antenna operation.

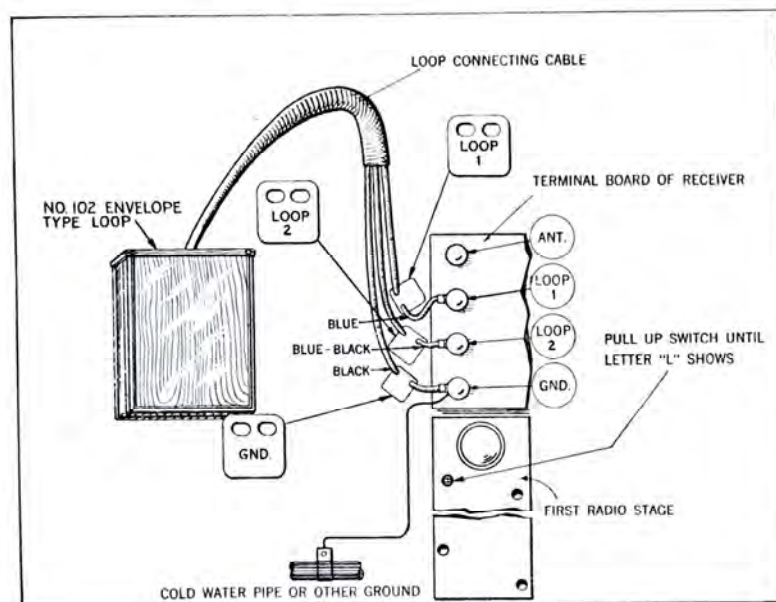


Fig. 32—Wiring of Loop Cable to Receiver Chassis Binding Posts.

§ 23—PRECAUTIONS WHEN USING A LOOP

- 1—Use only the Stromberg-Carlson No. 102 Loop, mounted on the bracket supplied with the loop.
- 2—Be sure to connect the loop conductors to the receiver binding posts.
- 3—Handle the loop with care when installing.
- 4—Always rotate the loop to obtain best results for selectivity and signal volume for each station tuned-in.
- 5—Remove the hands from the loop after revolving, to avoid detuning through "body capacity."
- 6—It has been found in practice that the signal waves from any particular broadcast station do not always come from the same direction, and this condition may gradually change during the reception of one program. Thus, it is advisable to test the position of the loop, when the signals fail to come through with the customary volume.
- 7—When the loop equipped receiver is located in a modern apartment building or other building with steel structure and metal lath work in the walls, it will be found that the loop usually points directly towards the nearest wall of the room for maximum signal pick-up. This is due to the fact that the magnetic waves from the broadcast station enter the window, or other outside opening, and follow the inner contour of the room walls.

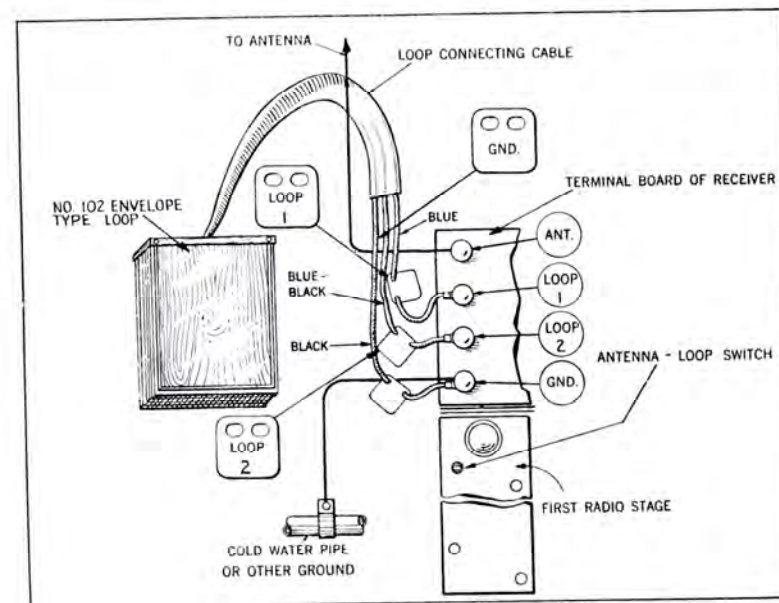


Fig. 33—Receiver wired for both Antenna and Loop Service.

8—Determine the best location for the loop equipped receiving set by trying the reception when placed in different positions in the room in which it is to be installed.

9—It is not to be expected that a concentrated loop type signal collector on this 7-tube receiver will be as efficient in picking up and amplifying extremely weak signals (on very distant stations) as a 60-foot outdoor antenna.

§ 24—HOME SERVICING OF RECEIVERS

Barring accidental damage in shipment or in handling, the No. 734 Radio Receivers will operate correctly when installed in accordance with the instructions contained in this book, providing the tubes and loud speaker are in good working condition. If the receiver should fail to operate correctly when first installed or at any later date, the following condensed list of possible reasons for the failure should be investigated and the "Special Service Instructions" followed to provide a suitable remedy:

(a) No Signal in Loud Speaker

- (1) Switch not turned to "ON."
- (2) House Current Supply turned off.
- (3) Station Selector not set correctly.
- (4) Volume Control not turned up.
- (5) No station broadcasting.
- (6) Loud Speaker not connected.
- (7) Antenna or ground connections open or Antenna grounded.
- (8) Antenna and Ground connections reversed.
- (9) Short circuited Lightning Arrester.
- (10) Defective Tube or Tubes in Receiver or Socket-Power Unit.
- (11) Tubes not making contact in sockets.
- (12) Defective connections to Socket-Power Unit.
- (13) Defective Loud Speaker.

(b) Weak Signal in Loud Speaker

- (1) Station Selector not set correctly.
- (2) No nearby or powerful broadcasting stations.
- (3) Volume Control not turned up.
- (4) Meter Adjuster not set so that pointer is on red mark on meter scale.
- (5) Poor connection in Antenna or ground circuit.
- (6) Antenna poorly insulated from supports, trees or buildings.
- (7) Antenna shielded by steel building, metal lathing or damp brick walls.
- (8) Inefficient tubes.
- (9) Tubes not making contact in socket.
- (10) Poor atmospheric conditions.
- (11) Signals fading.
- (12) Tubes other than R. C. A. Radiotrons or Cunningham Tubes.
- (13) Loud Speaker incorrectly adjusted.
- (14) Defective Lightning Arrester.
- (15) Antenna and Ground connections reversed.
- (16) Ground connection made in sandy or dry earth.
- (17) Ground clamp attached to pipe without scraping off dirt or paint.

(c) Noisy Reception in Loud Speaker

- (1) AC Supply Plug inserted wrong way in socket or outlet.
- (2) Stations on nearly the same wave length causing whistle.
- (3) Balancing Potentiometer on Socket-Power Unit not adjusted for quiet position.
- (4) Trouble at broadcasting station.
- (5) Defective Tube or Tubes.
- (6) Unavoidable noise picked up by Antenna.
- (7) Poor or loose contact with tube in socket.
- (8) Antenna poorly insulated.
- (9) Broken or defective Loud Speaker Cord.
- (10) Loose connections to Socket-Power Unit.
- (11) Microphonic Detector Tube.
- (12) Acoustic coupling between Loud Speaker and Receiver.
- (13) Volume Control set too high.
- (14) Poorly soldered Antenna or Ground connections.
- (15) Overloaded Loud Speaker or tubes.
- (16) Waterpipe or earth ground not used.
- (17) Poorly constructed Loud Speaker.

(d) Signals Not Clear

- (1) AC Supply Plug inserted wrong way in socket or outlet.
- (2) Heterodyning or squealing of two stations on same wave length.
- (3) Whistle from nearby radiating receiver.
- (4) Poor quality of modulation at broadcast station.
- (5) Acoustic coupling of Loud Speaker to set, shown by one or more musical notes unduly accented or prolonged.
- (6) Oscillation in receiving set from use of poor first radio tube.
- (7) Volume Control set too high, thus overloading tubes or Loud Speaker.
- (8) Use of a Loud Speaker of poor construction.
- (9) Station Selectors not set for maximum response for desired station.
- (10) Defective tube or tubes.
- (11) Socket-Power Potentiometer not adjusted correctly.

(e) Inability to Tune Out Undesired Stations

- (1) Antenna longer than 80 ft. including lead-in wire. Try a 20 or 30 ft. antenna.
- (2) Station Selector not tuned to maximum response for desired station.
- (3) Long or high resistance ground connections.
- (4) Transmission from nearby powerful broadcast station broadly tuned.
- (5) Two stations with wave lengths so close together as to allow overlapping of signals.

§ 25—SPECIAL SERVICE INSTRUCTIONS

The following paragraphs give servicing hints that will be of assistance to the owner who wishes to look after his own receiver installation:

- 1—**Incorrect Tuning:** In order to receive maximum clarity and best tone quality, the station selector must be set at the point of maximum signal strength for the desired station. Do this with the Volume Control turned down so as to get a sharp indication of the peak response.
- 2—**Incorrect Connections:** Care should be taken that the Socket-Power connections are all according to the correct circuit diagrams in this Instruction Book. Check carefully. (See Fig. 5.)
- 3—**Loose Connections:** All connections should be carefully checked to make sure that they are tight. The terminals on the shoe of the A-B-C Supply cable should be tightly held under the thumb nuts of the binding posts of the terminal board of the Socket-Power Unit. Tighten these connections by using a pocket metal disk as a screw driver, inserted in the slot in the thumb nut.
- 4—**Poor Contact in Tube Sockets:** If the prongs of the vacuum tubes are corroded or dirty, they will not make good contact with the springs of the tube sockets. Remove the tubes and scrape the tube prongs clean. If this does not help, the socket springs must be readjusted by someone equipped with tools designed for this purpose. A Stromberg-Carlson dealer can do this.
- 5—**Grounded Antenna:** If the antenna is accidentally grounded, indicated by broad tuning on the left-hand station selector and the weakness of the received signals, trace out the antenna lead and make sure that its installation is perfect where it runs along walls and through partitions and at its supports. If the trouble is not located, disconnect the antenna lead-in from the arrester and connect through directly to the receiver "ANT" post, so as to omit any connection of the antenna to the arrester, and re-test the receiver. If it now works correctly, the lightning arrester is defective and should be replaced by a new one.
- 6—**Swinging Antenna:** The antenna installation should be carefully inspected, making sure that the antenna or lead-in does not swing against trees, buildings, etc.
- 7—**Poor Connections in Antenna-Ground System:** Antenna or ground wires when spliced or connected to ground clamps, etc., should be soldered whenever possible. In any case, a good firm, clean contact is necessary.
- 8—**Inefficient Ground Connections:** The ground connection should be as short as possible to a cold water pipe or other good ground (Section 18). If the ground lead is long or is connected to a system of steam or similar pipes, it is liable to be high resistance. Noisy reception will generally result. Try using a wire as a "counterpoise," as suggested in Section 19. Inspect the ground clamp (if used) for tightness and for presence of dirt or paint between clamp and pipe.
- 9—**Defective Tubes:** Tubes may be defective in several ways. There may be an inter-element short circuit or the filament emission may be low. Check tubes by exchanging them, one at a time, with a tube that is known to be good. If one tube is found to be poor

or defective, check the rest carefully again so as to be sure that there are no more. Sometimes the vacuum tubes can be damaged by rough handling so that the filament becomes broken or the elements of the tube short circuited. (See Section 10.)

- 10—**Acoustic Coupling:** If a steady howl is given by the loud speaker, but not by a head set when plugged in, try moving the loud speaker in various positions in the room, keeping it well away from the receiver, also follow the directions concerning microphone detector tubes in Section 8.
- 11—**Incorrect Adjustment of Loud Speaker:** If the signals sound badly distorted or the loud speaker seems to rattle, the speaker should be adjusted according to the maker's instructions. See Section 29 for information covering the Stromberg-Carlson No. 10 and No. 11 Cone Type Speakers.

§ 26—INTERFERENCES AND DISTURBANCES

Disturbances that interfere with the clear reception of broadcast programs can be due to two causes:

First—Noises that are generated in the radio receiver circuit.

Second—Noises that are generated outside of the radio receiver and that are picked up by the antenna or loop and amplified, along with the desired broadcast signals.

The Stromberg-Carlson No. 734 Radio Receiver completely avoids all noises usually generated in the receiver itself by the special balancing of the circuits and the use of complete shielding over the individual radio amplifier and detector stages. Incorrect operation of the receiver, in no case, will generate noises that will radiate from the antenna or loop and interfere with neighboring receivers.

However, noises that are caused by natural "static," locally used electrical appliances and neighbors' radiating receivers, and collected by the antenna or the loop, naturally are magnified or amplified by the radio receiver, along with the desired signals, and are heard in the loud speaker. The sole function of any radio receiver is to amplify, without distortion, all of the signals that are tuned-in at any particular wave length or frequency. It is not possible to "sift" out these "noise" frequencies as most of them are of the same character as the frequencies of the desired signal.

It is obvious that the eliminating of these disturbances must be by either one or both of the following methods:

- (a) Eliminate or reduce the disturbance at its source.
- (b) Locate or arrange the antenna or loop of the radio receiver, so as to be in a favorable position for picking up the desired broadcast station signal and in an unfavorable position to collect local disturbing noises. (See Section 27.)

Unfortunately, it is not possible to remedy all of the disturbances at the source, but care in the installation of the pick-up usually will give a satisfactory installation for local stations and for most distant stations. The following is a list of disturbances and suggested remedies:

- (a) **Interference Between Broadcasting Station Programs:** The selectivity of the No. 734 Radio Receiver is ample to prevent this kind

of interference, provided the antenna is not too long, and the station signals do not overlap. (See Section 13 covering "Choice of Antenna and Location").

- (b) **Interference Due to Broadcasting Stations on Close Wavelengths:** When the broadcasting stations are operating on wave lengths that are so close together that the inaudible radio-frequency carrier waves combine to cause audible beat notes, the result is a steady squeal or howl of unvarying pitch. This seldom occurs unless one or both of the broadcasting stations are operating on an incorrect wave length, or when a very distant broadcasting station has an assigned wave length the same as or close to that of a local broadcasting station.

There is no remedy in the hands of the broadcast listener to entirely overcome this kind of disturbance, other than to listen to the station that comes in with the loudest signal and reduce the amplification by turning the Volume Control knob counter-clockwise or to the point where the interfering note is practically eliminated. If both stations come in with the same volume, there is no way to mitigate this type of interference.

- (c) **Radiation from Local Receiving Sets:** Practically all receiving sets, using the "regenerative" principle, and sets not provided with means to prevent "oscillation" act as miniature broadcast stations and radiate tuning and receiving noises, **when incorrectly operated.** These noises usually vary in pitch and sound like chirping of birds, howling and low pitched groans and can be picked up from a receiving set located many miles away. However, the louder noises of this character come from a neighboring receiving set. A correctly balanced "Neutrodyne" type of receiver will not radiate this kind of disturbance, so that when all of the receiving sets in use are of the "Neutrodyne" or balanced type, no disturbance of this kind will be possible. The Stromberg-Carlson No. 734 Radio Receiver does not oscillate or radiate when installed in accordance with these instructions, **therefore, will not cause disturbance to your nearest neighboring receiving set.**

The only remedy for this kind of disturbance is to suppress it at the source. A campaign of education has been inaugurated by radio clubs and various national radio associations to minimize and eventually eliminate this receiving set radiating disturbance. You can assist in this good work by conferring with your neighbor.

- (d) **Interference Due to Telegraph Code Signals:** Telegraph code signals, sounding like continuous dots and dashes, usually come from so-called "spark sets" and can be local or distant commercial or ship stations. Nearly all of the commercial and ship stations are without the broadcast range and are gradually eliminating the "spark sets" or are working these sets on a schedule that avoids interference with evening broadcast programs.

The great selectivity of the Stromberg-Carlson No. 734 Radio Receiver reduces this kind of disturbance to a minimum.

- (e) **Interference Due to Static:** All noise due to atmospheric electricity and local man-controlled electricity is commonly called "static." This disturbance sounds like a continuous roaring noise with occasional crashes and other varying or steady superimposed noises.

The atmospheric static is greater in summer than in winter and usually is more noticeable at night than in daytime. When the volume of the "static" exceeds that of the signal from the desired broadcast station, it is impossible for any radio receiver to bring in the programs satisfactorily. Devices for eliminating "static" also eliminate signal frequencies that are absolutely necessary for high quality audio reception. The only remedy is to be content with programs that come in with greater volume than that of the "static." Always keep the Volume Control turned down when the static level is high.

Other noises included under the heading of "Static" are caused by one or more of the following:

- 1—Switching-on and off of lamps and other electrical devices.
- 2—Electric flat irons with thermostatic heat control or loose plug.
- 3—Electric heating pad with thermostatic heat control.
- 4—Door bells and buzzers while being operated.
- 5—Electric vacuum cleaners.
- 6—Sewing machine motors.
- 7—Furnace thermostat motors.
- 8—Oil burners that use spark ignition (some types).
- 9—Oil burners operating motors.
- 10—Refrigerator motors or electric control.
- 11—Violet ray machines.
- 12—Ozonators.
- 13—Motors with sparking brushes.
- 14—Battery chargers of vibrating type and some electrolytic types.
- 15—Ignition systems on private home lighting plants.
- 16—Electric elevators using commutators.
- 17—Hum caused by some types of "B" Socket-Power Units, having unsatisfactory filter system, or with magnetic coupling to audio apparatus of the receiver.
- 18—Bad contact in electric house lighting system switch, lamp socket, fuse or other connected device.
- 19—Electric sign flashers.
- 20—Electric street cars and electric railroads.
- 21—Electric smoke and dust precipitators.
- 22—Telephone exchange pole changers and ringing converters, if not protected by suitable shunting devices.
- 23—Induction from telephone and telegraph lines.
- 24—Some arc light systems.
- 25—Electric welding apparatus.
- 26—X-ray machines.
- 27—Static electricity produced by running belts.
- 28—Static electrical machines.
- 29—Stock tickers.
- 30—Electric furnaces of some types.
- 31—Motion picture projectors using arc lamps.
- 32—High voltage testing equipment.
- 33—Defective electrical power circuits and apparatus.

Fortunately practically none of the above listed disturbances (steady disturbances) are picked up by a receiving set located in a residence building, although they may be encountered to a more or less extent in steel frame apartment houses, stores and factory buildings. Thus a satisfactory demonstration of a sensitive and powerful radio receiving set is best made in the ultimate location rather than in a store or other salesroom.

If the No. 734 Radio Receiver is to be installed in a steel framed building, where the disturbing "static" is generated inside this metal frame work, the use of an outside antenna with a short length of lead-in wire between the radio receiver and the outside wall of the building usually will greatly reduce the effect of this locally generated noise.

§ 27—HOW TO AVOID DISTURBING NOISES

Noises such as a loud crashing or a continuous hum heard in the loud speaker may be generated in the radio receiver or may be noises which are picked up by the antenna and simply amplified in the receiver along with the desired broadcast signal.

To determine whether noises are generated in the receiver or are of external origin, disconnect the Antenna wire (if used) from the receiver, push in the Antenna-Loop Switch (Fig. 17) so that only the letter "A" is exposed, and observe whether the noise continues with a very much reduced or at full volume. If the noise continues at full volume, the disturbance is generated within the receiver or tubes. The source of the disturbance may be removed by following the "Special Service Instructions," Section 25; if not, consult an authorized Stromberg-Carlson dealer.

If the noise is entirely eliminated or continues only at a reduced volume (there is always a short length of pick-up conductor between the Antenna binding post and the first shielded compartment to act as an antenna for nearby electrical disturbances), the noise is due to atmospheric static or to local electrical disturbances, and not to faulty operation of the receiver.

If the antenna and ground are correctly installed and all connections tight, then careful tuning of the receiver will cut down the outside noise to a considerable extent. A good rule to follow is:

Rule 1—Always Keep the "Volume Control" knob turned down (counter-clockwise) to the point where the Station Selector tunes sharply to a point on the dial where a definite maximum loudness of signal is heard.

Now if greater volume of loud speaker signal is desired, the volume control can be slightly advanced, so long as the disturbing noise does not become objectionable. Keeping the volume control turned too high also overloads the detector and audio tubes, resulting in poor quality (rattling and hissing) of the signals.

When the noise heard in the loud speaker is due to a local electrical disturbance, it is best to determine the source and make corrections at that source. (See Article 26.) In many cases this is not possible, therefore the next best remedy is to so locate the antenna as to avoid picking up the disturbance. Follow this rule to avoid noise pick-up:

Rule 2—Always locate the antenna so that it will be more exposed to the desired broadcast signal than to the local disturbing electrical "noise."

If the receiver is located in a steel frame building or in a building with metal lathing, and electrical "noises" are generated inside the building by motors or other electrical devices, then it is obvious that an inside antenna would be very unsatisfactory, due to its free exposure to the local "noises" and to the fact that it is shielded against the outside signals from the desired broadcasting station. Thus two more rules can be formulated:

Rule 3—Always locate the antenna as far away from local generated electrical "noises" as possible.

Rule 4—Always locate the antenna outside of a shielded building when inside "noises" are present, so that as much of the pick-up wire as possible will be in a favorable position for collecting the desired broadcasting signals and so that this wire will be in an unfavorable position to collect the inside "noise."

When following the latter ruling to its limit, there should be no long stretches of lead-in wire between the outside antenna and the receiving set, as this wire will act as a pick-up for the inside "noises." Also the outside antenna wire is best located when its open end is at the greatest distance from the building or from the source of electrical noise.

In many cases the ground connection acts as a collector of "noise." This is particularly true when the ground wire is long or is attached to a heating system pipe with high resistance rusted joints between the point of attachment and moist earth. Thus a good rule to follow is:

Rule 5—Always make the ground connection to a cold water pipe where possible.

When a good ground connection, free from "noise" pick-up is not possible, then the next best scheme is to use what is known as a "counterpoise." (See Section 19.) This is merely a length of insulated wire, connected to the ground binding post of the receiver and stretched along the floor or down a hallway for 30 feet or longer. It should not be connected to any metallic objects and the antenna should be as favorably located as possible to pick up the desired broadcast signal and so as not to pick-up the local "noise."

Rule 6—A counterpoise "ground" should be used when a short length low resistance connection to earth, that is free from "noise" pick-up, is not possible.

No doubt, the greatest cause for excessive noise pick-up is in the use of an antenna that is too long for the receiver. It must be remembered that the antenna is a part of the amplifying system of a receiving set installation, and the longer the antenna the greater the amplification possible. When the receiver has a greater amplifying power within its circuits, the antenna need not be as long as when the receiver is of less amplifying power. Thus the three stages of radio amplification provided in the No. 734 Radio Receiver requires a shorter length of antenna than is necessary for receivers having only two stages of radio frequency amplification.

In general, the total length of antenna, including the lead-in, should not exceed 80 feet of single wire for the No. 734 Receiver. With powerful local broadcast signals, the total length of antenna might be cut down to less than 30 feet if it is located in a position to efficiently pick up the desired signals. Thus the following rule should be observed:

Rule 7—A short antenna (less than 30 feet long) should be used only when it can be located in a position to efficiently pick up broadcast signals and when there are no local disturbing noises to interfere with the reception.

Reducing the length of antenna will not always act favorably to prevent the picking up of "noise," for if the noise is local and confined to the building, then the shorter the antenna length the greater the amplification necessary (increase of volume control in the receiver) to make up for loss in amplification due to the shorter antenna if the loud speaker volume for the desired broadcast signal be kept the same for each condition.

The turning-up of the Volume control, to compensate for decreased antenna length, naturally will increase the amplification of the local noise to a greater extent than that of the desired broadcast signal as the portion of the antenna exposed to the local disturbance remains practically the same whether the antenna is of a long or a short length. Thus the following rule should be observed:

Rule 8—Use a long antenna for reducing the noise background in the loud speaker when the disturbing "noise" is local and close to the receiver.

When it is possible to get away from local "noise" conditions with the use of a fairly long antenna (not to exceed 80 feet, including lead-in wire), then it is preferable to use this longer antenna for the extra pick-up that is required for daylight reception. This longer antenna also is preferable for use in the country, as usually there are no local or powerful broadcasting stations to interfere. (See Rule 9.)

The length of antenna also is dependent on whether it is possible to have complete control of the loud speaker volume by means of the Volume control on the receiver without resorting to detuning the station selector for reducing loud speaker volume when listening to the most powerful local broadcast station signals. Therefore, this gives another good rule to follow:

Rule 9—The size of antenna should be limited to the length that will allow the most powerful broadcast signal to be tuned sharply to resonance (maximum response) on the station selector and so as not to give too great a volume on the loud speaker when the Volume control is turned fully down (counter clockwise).

The reason for this ruling is that detuning the station selector, in order to cut down volume, always results in impairment of quality and promotes interference and noise pick-up.

In unfavorable locations, the use of a short antenna for local reception and a long antenna for distant with a switch to cut-in one or the other (see Fig. 22) will satisfy the radio fan who is after the maximum range that is possible with the No. 734 receiver and at the same time give full control of the amount of noise background that might be encountered, due to atmospheric changes throughout the year.

When the No. 734 Radio Receiver is installed in a location where an outdoor type of antenna is not possible, due to building restrictions and where the building or location is shielded against "capacity" type of pick-up, then the loop (magnetic type of pick-up) may be used as described in Sections 20 to 23, inclusive. This gives the following rule:

Rule 10—When the location is unfavorable for an antenna pick-up system, the loop type of collector may be used to advantage.

Due to the completeness of the shielding of the No. 734 Radio Receiver, and to the careful design of the receiver circuits, the only "noise" that can reach the loud speaker is that actually picked up by the antenna or loop and amplified along with the desired signal. The powerful radio amplification provided in these receivers allows for many installation precautions against "noise" pick-up that could not be used with receivers of less amplification or with receivers having no shielding.

§ 28—NO. 1 PHONOGRAPH PICKUP OUTFIT

The Stromberg-Carlson No. 1 Phonograph Pick-up Outfit contains all of the accessories required to equip the No. 734 Radio Receiver to reproduce speech or music from Phonograph records. The outfit comes completely wired and ready for use. The items included are as follows:

- 1 Magnetic Pick-up Unit.
- 1 Supporting Arm including knuckle joint and cast base for this arm provided with soft rubber cushion on the bottom.
- 1 Volume Control Unit containing a Scratch Filter.
- 1 Short Cord connecting the magnetic pick-up with the Volume Control Unit.
- 1 20 ft. two conductor cord already wired with No. 60 Plug attached for connecting to the Radio Receiver.

The Magnetic Pick-up employed is an instrument of the finest quality, designed to respond faithfully and with a level volume of pick-up to any recorded tones of the musical scale. The function of the Scratch Filter is to eliminate all record scratch or needle noise. Steel needles, soft or medium, are recommended for use with this outfit.

When used with the highly developed Audio Amplification system of the No. 734 Radio Receiver, and the highly sensitive No. 10 and No. 11 Cone Speakers this Magnetic Pick-up Outfit will permit the reproduction of recorded music with new clarity, freedom from needle scratch, a new uniform response to all frequencies, faithfulness of tone and delicacy in shading.

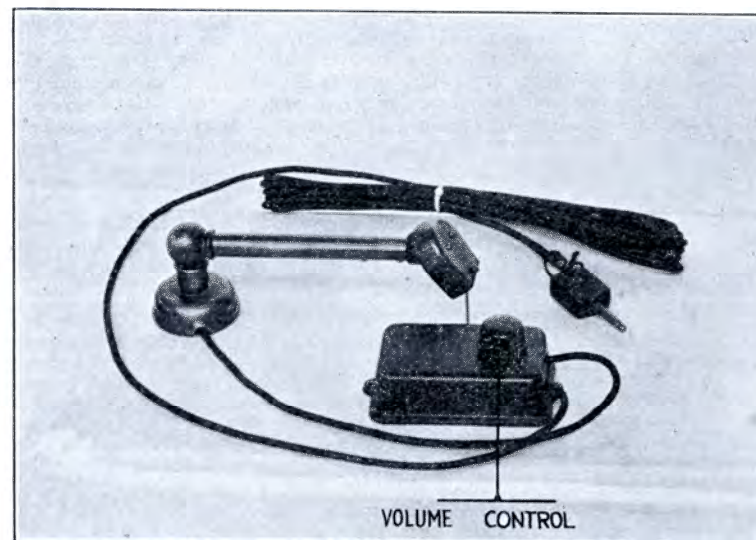


Fig. 34—Stromberg-Carlson No. 1 Phonograph Pick-up Outfit, recommended for use with the No. 734 Radio Receiver for reproducing Phonograph music.

§ 29—NO. 10 AND NO. 11 CONE TYPE LOUD SPEAKERS

For use with the No. 734 Stromberg-Carlson Receiver, only the No. 10 and No. 11 cone type loud speakers are recommended. The No. 10 speaker is of the furniture type mounted on a walnut floor pedestal. A 21-inch cone is employed and this speaker comes equipped with a long cord and a No. 60 Radio Plug to allow for quick installation. The total height of this speaker on its pedestal is 37 inches.

The cone or radiator and the mechanism of the No. 11 Speaker are identical to those of the No. 10 floor type, but the No. 11 Speaker is designed to hang on a wall. This speaker is provided with a heavy decorative suspension cord with tassel and a long connecting cord with No. 60 Radio Plug attached. The connecting cord is brought into the cone speaker through the suspension cord from the picture moulding. The connecting cord can then be brought down to the receiver from the picture moulding along a window frame or in a corner of the room, so that all connections are practically out of sight.

The cone used in these speakers is made from acoustic fiber which has been gathered on a form to make up a seamless, water-proofed cone with no grain to the parchment. The cone is tapered, being thicker at the outside rim than at the apex or center of the cone. A 21-inch size of diameter has been found ample in a cone speaker to handle all of the desirable audio frequencies at a volume level as high as can be used in a small hall or in the largest living room of a home.

The many novel features incorporated in this Cone Speaker have overcome the two objectionable characteristics which cone speakers have had in the past. Tapering a cone, built up of seamless tough material with no grain or weakness in any one direction, has overcome the oil can effect known as "paper rattle." Moreover, this cone is capable of reproducing faithfully and correctly, all of the notes in the musical scale from below 50 cycles to above 4,700 cycles with a relatively small degree of movement of the apex and driving mechanism. This has made possible the use of a stiffer driving mechanism than could be employed with former inefficient cone speakers and the new mechanism will retain permanently the adjustment given it at the factory.

No other cone speaker tested in our Acoustical Laboratories will bring out, as faithfully, the bass notes which these receivers are capable of reproducing. Other speakers will not reproduce these notes but only the higher second harmonic. In fact, very few reproduce fundamental frequencies below 150 cycles.

The naturalness of the reproduction of the No. 10 and No. 11 Cone Type Speakers is due to the absence of tone quality. Tone quality is the result of the resonance of some portion of the instrument. This is of value in musical instruments, but it is a decided disadvantage in a loud speaker. It is often erroneously thought that cone speakers of high quality should have a pleasing and distinctive tone all their own. A good speaker, however, should have no resonance points, should not exaggerate any particular tones or bring out prominently any particular overtones. True fidelity of reproduction can only be obtained from a speaker which produces only those tones and overtones of the musical instrument whose sounds are being reproduced without adding any new overtones of its own.

One of the most simple tests for correct reproduction is listening to speech, especially when the voice of the speaker is known to the listener. Reproduced speech should be just as natural as the original. The voice should be



Fig. 35—Stromberg-Carlson No. 10 "Tip-Top-Table" Type Cone Speaker

as clear and understandable as though the distant speaker was in the room.

Location of Cone with Respect to Radio Receiver: A long connecting cord and plug are supplied with the No. 10 and No. 11 Cone Speakers to allow the sound radiator to be placed at a considerable distance from the radio receiving set for the following reasons:

- (a) To allow for correct judging of volume when tuning the receiver.
- (b) To allow the speaker to be located in the most convenient position in the room.
- (c) To select a separation between the speaker and the radio receiver that will avoid "acoustic coupling." This is a steady tone that can occur when the detector tube is "microphonic" and is best remedied by selecting a non-microphonic tube for a detector. (See Section 8.)

The Stromberg-Carlson Company is licensed by the Lektophone Corporation under its patents to manufacture Cone Speakers.

§ 30—UNPACKING AND SETTING UP THE NO. 10 CONE SPEAKER

The No. 10 Cone Speaker is packed for shipment in a special reinforced box of corrugated board. The cone assembly and the three metal feet are removed from the pedestal.

Carefully preserve this specially constructed box for future use if, for any reason, it is desired to re-ship this cone speaker.

After unpacking, the three metal feet should first be attached to the pedestal and then the cone assembly mounted by two pivot screws. A long cord and plug are provided with this speaker, one end of the cord already being drawn up through a hole in the stem of the pedestal and provided with spade tips for connecting to the two binding posts of the loud speaker mechanism. This connection can easily be made by hand, no tools being required.

In order to protect the operating mechanism, this loud speaker is packed with the small thumb nut on the front of the cone loosened. This nut is so designed that it will not completely unscrew and become lost, and it is recommended that this thumb nut always be loosened when moving the speaker from place to place. However, when ready for use tighten this thumb nut securely **with the fingers**. Occasionally, it is advisable to loosen this adjusting nut for an instant and immediately re-tighten with the fingers, in order to compensate for expansion or contraction of the cone. This adjustment should be made also at such times when the loud speaker fails to operate satisfactorily.

Always operate with the volume control of the receiver **below the overload-point of the tubes**, otherwise the naturalness of the reproduction will be destroyed and a "rasping" or "rattling" effect will result.



Fig. 36—Stromberg-Carlson No. 11 Wall Type Cone Speaker

§ 31—UNPACKING AND SETTING UP THE NO. 11 CONE SPEAKER

The No. 11 Wall Type Cone Speaker is shipped completely assembled in a specially designed box of reinforced corrugated board. It is provided with a 45-foot cord and a No. 60 Radio plug already connected and is ready for operation when hung on a picture hook or from the moulding. Carefully preserve this special box for future use if, for any reason, it is desired to re-ship this cone speaker.

In order to protect the operating mechanism, this loud speaker is packed with the small thumb nut on the front of the cone loosened. This nut is so designed that it will not completely unscrew and become lost, and it is recommended that this thumb nut always be loosened when moving the speaker from place to place. However, when ready for use tighten this thumb nut securely **with the fingers**. Occasionally, it is advisable to loosen this adjusting nut for an instant and immediately re-tighten with the fingers, in order to compensate for expansion or contraction of the cone. This adjustment should be made also at such times when the loud speaker fails to operate satisfactorily.

Always operate with the volume control of the receiver **below the overloading point of the tubes**, otherwise the naturalness of the reproduction will be destroyed and a "rasping" or "rattling" effect will result.

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