

# Radiola A C

## 2-Stage Audio Amplifier

### INTRODUCTION

It frequently happens that the audio frequency signal strength from a crystal or vacuum tube detector is so small that the sound produced in the telephone headset is not sufficient to properly affect the human ear. Also, when this is not the case, it is

several times that of the detector and yet the wave form of the currents will be similar. A transformer and tube together constitute one stage of amplification. The amount of amplification obtainable in one stage depends upon the ratio of the transformer and the characteristics of the tube. If one stage is not sufficient, two or more stages may be used in cascade.

### RADIOLA AC

The RADIOLA A C is a two stage, audio frequency, transformer coupled amplifier. It consists of two transformers designed for the amplification of music and speech, two vacuum tube sockets, two rheostats, a bias battery and three jacks, all mounted below a molded bakelite panel and enclosed in a neat mahogany box. In general appearance it closely resembles the Radiola Sr. and is intended for use with it.



Fig. 1—Radiola AC Audio Amplifier

very often desirable to operate a loud speaker so that a telephone headset need not be worn and so that more than one person may listen. In either case, it is desirable to amplify the audio frequency output of the detector. The type WD-11 three electrode vacuum tube is admirably suited to this purpose. The signal currents from the detector are made to pass through the primary of a transformer and thereby induce potentials in the secondary, these potentials being applied to the grid of the amplifier tube where they cause changes in its output current. If the transformer is properly designed and suitable batteries are provided, the output of the amplifier will be

### EQUIPMENT

**STANDARD**—The standard equipment furnished under the style No. 365112 consists of the following items:

- 1—Two stage audio amplifier as described
- 1—Telephone plug, style 307425
- 2—Radiotron dry cell vacuum tubes Type WD-11

#### ADDITIONAL EQUIPMENT NECESSARY

The following items will be needed in addition to the above. They are not furnished since batteries deteriorate when not in use and the other items will probably be at hand.

- 1—Radio receiving set, including detector, preferably Radiola Sr.
- 2—Standard No. 6 dry cells
- 2 or 3—22½ volt "B" batteries
- 1—Telephone headset or loudspeaking receiver

It is possible and frequently desirable to use other sources of filament heating current than the dry cells specified above. A single lead storage cell giving about 2.2 volts will give excellent results but will require charging at intervals. If it is inconvenient to charge a storage cell, Edison Lalande primary cells may be used. Two cells in series will be required.

## USES

### WITH RADIOLA SR:

**Location**—Place the amplifier to the left of the Senior. Corresponding binding posts on both sets will then be in line. Connect the binding posts marked "Phones" on the Senior to the posts marked "Input" on the Amplifier. Connect the "—A—B Battery" posts together.

**"A" Battery**—Connect the negative (outside) binding posts of three dry cells together and to one of the "—A—B Battery" posts. Connect the positive binding posts of the remaining two cells together and to the "+A Battery" post on the Amplifier.

**"B" Battery**—Connect two or three  $22\frac{1}{2}$  volt "B" batteries in series. Connect the remaining free negative lead to one of the "—A—B Battery" posts. Take a tap from between the first and second "B" batteries and connect it to the "+B Battery" post on the Senior thus supplying the detector tube with a plate potential of  $22\frac{1}{2}$  volts. Connect the remaining positive lead from the "B" battery to the "+B Battery" post on the Amplifier, thus supplying the amplifier with either 45 or  $67\frac{1}{2}$  volts plate potential.

**Telephone Headset or Loudspeaker**—Connect the terminals of the cord supplied with the telephone headset or with the loud speaking receiver to the telephone plug provided with the Amplifier. Insert the plug into the jack corresponding with the degree of amplification desired.

### WITH ANY OTHER RECEIVER:

Make battery connections as previously described except that the directions for connection to the other set will no longer apply. The same "B" batteries may be used for the detector as for the amplifier. The posts on the amplifier marked "Input" should be connected to the place where the telephone headset is usually connected to the detector. The output of the amplifier is obtained through the jacks.

## OPERATION

### GENERAL:

The jacks used with the Amplifier are of the type known as filament control jacks. Besides making the proper connections to the telephone plug in the usual way, an extra pair of contacts is provided which controls the filament current. The circuits are so arranged that when the plug is inserted in the jack marked "Detector", telephone connections are

made to the detector only and neither of the tubes in the Amplifier will light. When the plug is inserted in the jack marked "1st stage", the filament circuit of the first amplifier tube is closed through the rheostat which should then be adjusted to give the proper filament temperature. Connection is also made between the telephone receivers and the output circuit of the first amplifier tube so that one stage of audio amplification will be in use. A similar condition exists when the plug is inserted in the jack marked "2nd stage" except that both tubes will light and the telephone receivers will be connected to the output of the second stage.

**Filament Current Adjustment**—The filament current of each tube must be adjusted separately by its own rheostat. After this adjustment has been made, the rheostats may be left in position and the filament current will be controlled automatically by inserting the plug in the proper jack. The tubes used with this Amplifier have an oxide coated filament, the operating temperature of which is just high enough to produce a dull red heat. It is advisable to operate tube filaments at as low a temperature as possible but the temperature should be high enough to produce satisfactory operation. The filaments may be seen by looking through the top of the tube.

## MAINTENANCE

**General**—If the RADIOLA AC is handled properly during shipment and if care is used in operation, nothing should require replacement except the tubes and batteries.

### RENEWAL OF TUBES:

If the directions for operating the Amplifier are carefully observed the vacuum tubes will have an exceptionally long life. When the filament of a tube does burn out or break, the tube must be replaced by a new one. Use the style number on the base when ordering spare tubes or replacements.

**Renewal of "A" Battery**—After about two months of use, the dry cells used to heat the filaments will become exhausted and will be unable to supply sufficient current to heat the filaments to the proper temperature. When this condition occurs, the dry cells must be replaced by new ones. A fresh cell supplying one tube should give about 50 hours of service when used 2 hours per day.

If a storage battery is used, it may be recharged from a suitable source of direct current. If alternating current only is available, a rectifier such as the "Rectigon" may be used.

If Edison primary cells are used, new elements and chemicals may be obtained from the makers or from electrical supply houses.

**Renewal of "B" Battery**—After "B" Batteries have been in service for 8 to 12 months they become exhausted. When this happens, the signals become weak and erratic. This condition can be remedied by replacing the exhausted battery by a new one.

**Renewal of "C" Battery**—The "C" or bias battery is the small unit cell mounted in a holder between the tube sockets. This cell is not required to furnish any current so should last 8 to 12 months. When exhausted it must be replaced by a new one. The usual symptoms of an exhausted "C" battery are noisy operation and distorted signals. The best plan is to replace the "C" battery whenever the "B" battery is renewed. To do this, the set must be removed from the cabinet by taking out the four nickel plated screws, two at the back and two at the front edges of the panel. The entire apparatus may then be removed from the cabinet by simply lifting out the panel. To remove the "C" battery from the holder, loosen the two hexagonal nuts that hold the nickel plated bar. Remove the bar and the cell will slip out. Put in a new one taking care that the end with the little brass cap is toward the panel and replace the bar and see that the nuts are securely tightened. Ever ready Unit Cell No. 935 or other make of cell of the same size may be used.

**Operating Troubles**—If any operating troubles occur which the above renewals will not remedy, a careful inspection should be made to see that all connections are good. If trouble still persists, the services of a competent radio electrician should be obtained. To assist in locating trouble, the following description and diagram of connections is included.

## ELECTRICAL DESCRIPTION

Fig. 2 is an interior view of the Radiola AC showing the arrangement of parts. Fig. 3 is a diagram of

connections. Corresponding parts in both figures are designated by the same letters.

Audio frequency energy from the plate circuit of the detector comes to the binding posts marked "Input". From there it goes directly to the telephone headset through the jack (R) when the plug is inserted there. Otherwise it goes to the primary of the amplifying transformer (M) which together with the vacuum tube (K) makes the first stage of amplification. The rheostat (O) controls the filament current of tube (K) and connection of the telephone headset is made through jack (S). When the plug is not in jack (S), the output of tube (K) is fed directly into the primary of transformer (N) which together with tube (L) makes up the second stage of amplification. (P) is the rheostat controlling the filament current of tube (L) while (T) is the jack through which connection is made between the telephone headset and the output of the second stage. (Q) is a small flashlight cell which acts as a grid bias for both tubes.

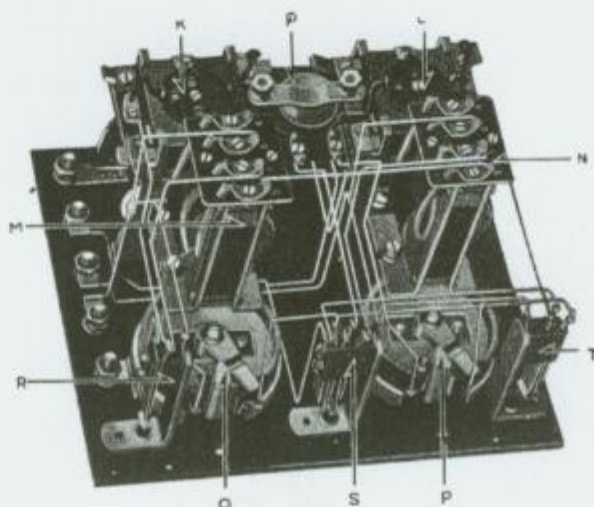


Fig. 2—Radiola AC Audio Amplifier, showing arrangement of parts

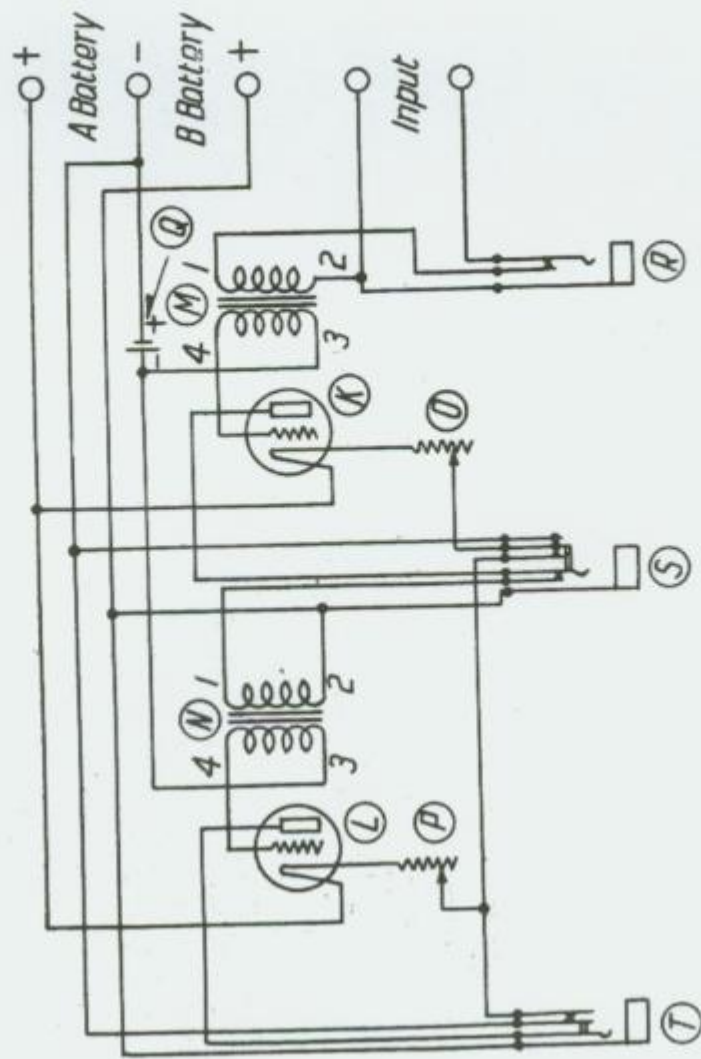
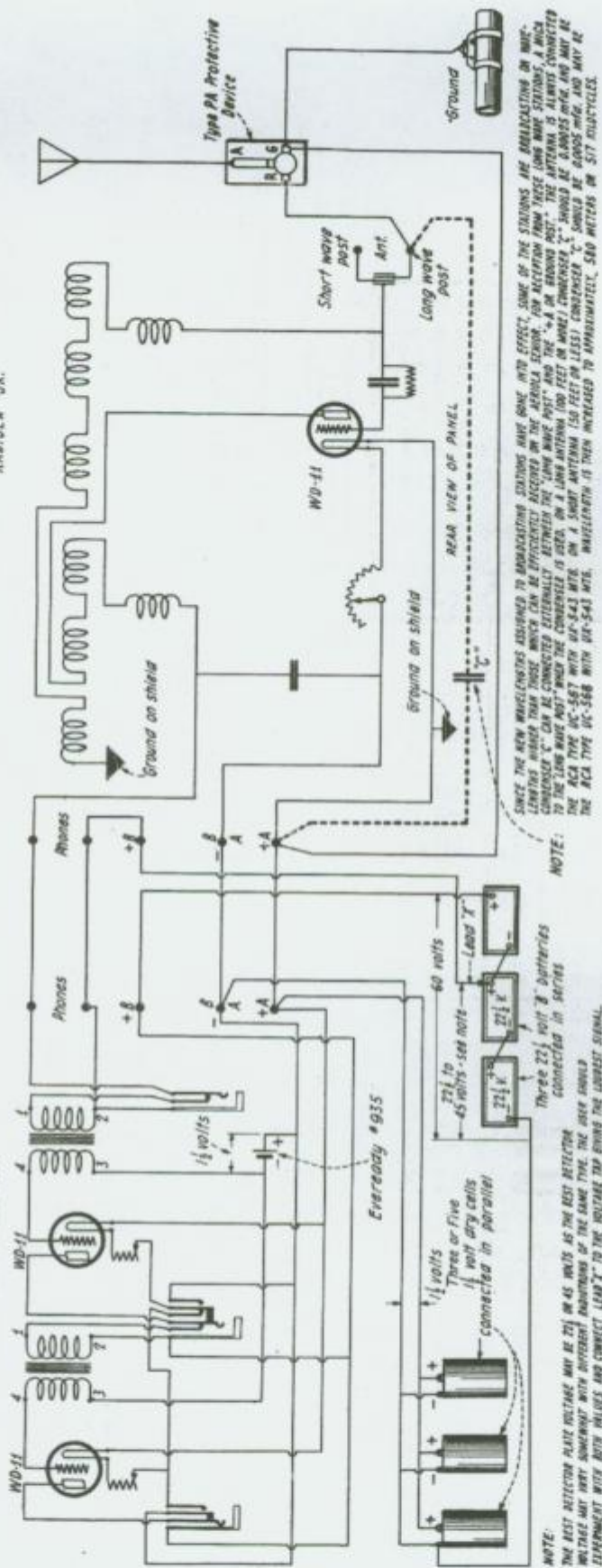


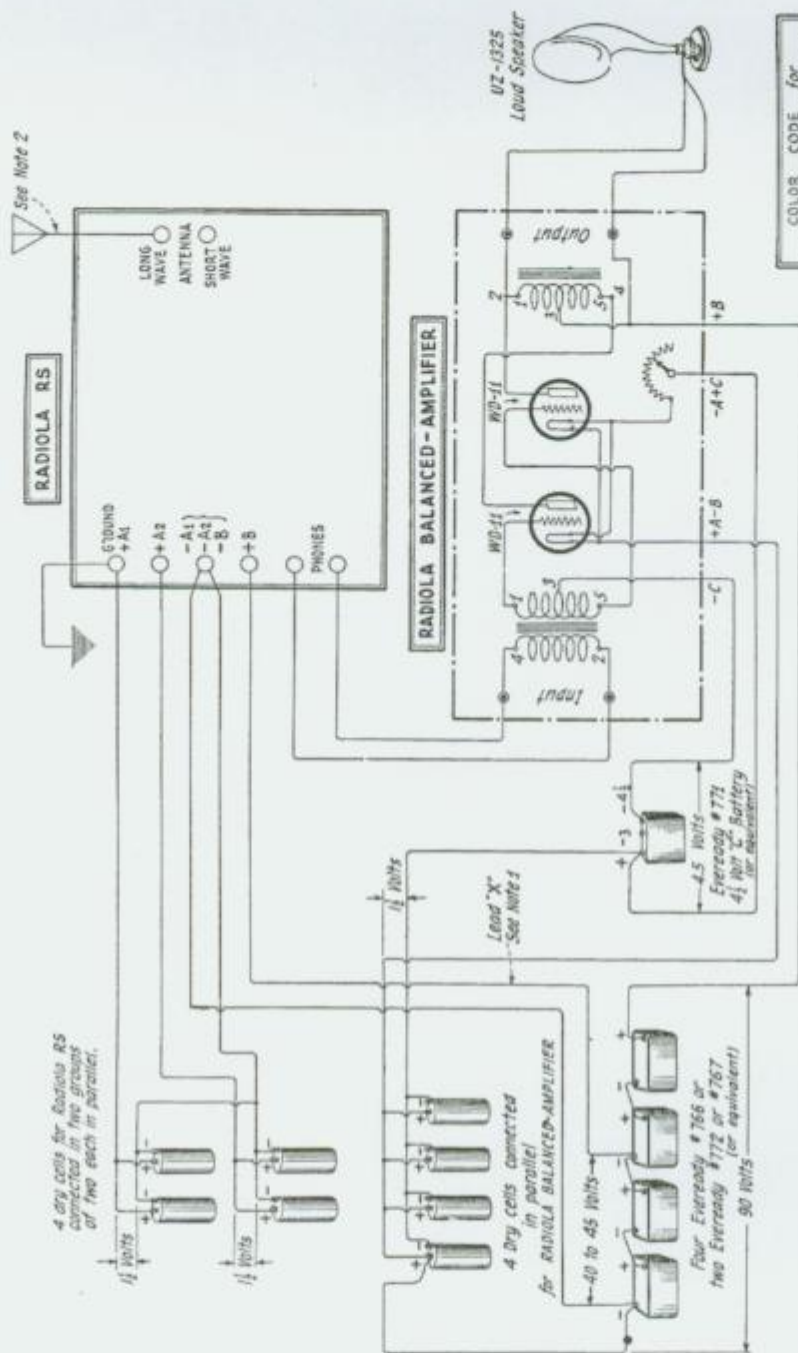
Fig. 8—Diagram of Connections of Radiola AC Audio Amplifier

# RADIOLA SR. AND TYPE A C AMPLIFIER

TYPE AC TWO STAGE AUDIO FREQUENCY AMPLIFIER

RADIOLA SR.





NOTE 1: BEST RESULTS WILL BE SECURED WITH A DETECTOR PLATE VOLTAGE BETWEEN 250 AND 45 VOLTS AS THE BEST DETECTOR VOLTAGE MAY VARY Slightly WITH DIFFERENT RADIOS. IF THE SAME TYPE, THE USER SHOULD EXPERIMENT BETWEEN THE LIMITS OF 250 AND 45 VOLTS AND CONNECT LEAD "X" TO THE VOLTAGE TAP GIVING THE LODEST SIGNAL.

NOTE 2: AN ANTENNA HAVING A LENGTH OF 65 FEET (INCLUDING THE LEAD-IN) IS RECOMMENDED.

**CONNECTIONS FOR  
RADIOLA RS AND BALANCED-AMPLIFIER  
COMMON "B" BATTERY SUPPLY**

COLOR CODE FOR RADIOLA BALANCED-AMPLIFIER		PRESENT PRODUCTION
LEAD	EARLY PRODUCTION	BLACK
-C	YELLOW	BLACK
+A-B	RED	YELLOW WITH RED
-A+C	BLACK	ANY BLUE TAPING
+B	GREEN	YELLOW TAPING
		RED