

Radiola AR

Radio Frequency Amplifier

INTRODUCTION

Preface—The RADIOLA AR is a three-step radio frequency amplifier designed to be used with the Radiola RA tuner and DA detector-amplifier. It will so increase the sensitivity of the above combination that reception may be accomplished over long distances with a loop antenna. If very great range is desired, an aerial may be used when many stations not previously heard will be received.



RADIOLA AR

Radio Frequency Amplification—The advantage of radio frequency amplification lies in the fact that a signal that is too weak to operate a detector satisfactorily may be amplified while still at radio frequency until it is strong enough. This enables the reception of many stations that are so far away that their signals are too weak to actuate a detector directly.

EQUIPMENT

Standard Equipment—The RADIOLA AR, style 319518, consists of a complete three-step radio frequency amplifier ready to operate, except for tubes and batteries.

Additional Equipment—The following additional equipment is necessary for the satisfactory operation of the RADIOLA AR:—

- 3 Radiotron model UV 201 vacuum tubes
- 1 6-volt storage battery
- 3 or 4, 22½-volt "B" batteries
- Suitable tuner and detector, preferably Radiolas RT and DA

APPLICATIONS

General—The RADIOLA AR radio frequency amplifier is one of a series of similar units: Radiola RA, Regenerative Tuner; Radiola RT, Antenna Coupler; and Radiola DA, Detector Amplifier. It is designed to be used with the other units in the various combinations described in this booklet.

With Radiolas RT, DA and Loop—Fig. 1 shows the arrangement of Radiolas RT, AR and DA with a loop. This arrangement will be found excellent where too great a range is not desired. The directional properties of the loop will greatly assist in eliminating interference from nearby stations while the radio frequency amplification will make possible the reception of signals from relatively distant stations.

When using a loop, a condenser is the only thing required to tune the antenna circuit. Therefore, only the condenser of Radiola RT is used. Connections should be made as shown in Fig. 1.

With Radiolas RA, DA and Loop—In case Radiola RA is available, it may be used in place of Radiola RT. The connections will be as shown in Fig. 1, except that the "Tickler" (lowest two) binding posts on Radiola RA will be idle.

With Radiola RC and Loop—When Radiolas RA and DA are available in the form of Radiola RC, the connections will be similar to those shown in Fig. 3, except that the loop will be connected to Radiola RA as shown in Fig. 1. **RADIOLA AR** may be placed on either side of Radiola RC and the connections arranged accordingly.

With Radiolas RT, RA and DA—Fig. 2 shows the best combination. It comprises a coupled circuit with Radiolas RT and RA with radio frequency

amplification by RADIOLA AR followed by detection and audio amplification in Radiola DA. This combination provides the selectivity of a coupled circuit which is necessary for satisfactory operation with radio frequency amplification.

It is necessary for best results to provide more coupling between the tuning circuits than is provided by their variometers. To do this, use is made of the tickler winding on the Radiola RA. The antenna circuit will then consist of Radiola RT and part of the tickler winding of Radiola RA as shown in the figure. Usually good results will be obtained with the tickler at two or three divisions from "Min."

With Radiolas RT and RC—If Radiola RC is available instead of Radiolas RA and DA, the sets should be arranged as shown in Fig. 3. This is exactly the same combination of parts as in the preceding paragraph. It will be necessary to exercise care in making the radio frequency connections between Radiolas AR and RC, so that there will not be so much feed back that the amplifier will oscillate. If trouble of this kind is experienced, it is possible to stabilize the circuit by bending the wires into different planes or the connections and stability may be improved by interchanging Radiolas RA and AR by making the necessary extra holes in the cabinets. The arrangement will then become the same as in Fig. 2.

Miscellaneous—It is possible to use RADIOLA AR with other apparatus than that described above. Such uses will suggest themselves to both the experimenter and experienced operator.

INSTALLATION

The RADIOLA AR is an additional piece of apparatus intended for use in one of the combinations previously described. Instructions for the proper installation and operation of the other units are furnished with them.

The binding posts at the back of the cabinet are plainly marked so that no difficulty should be experienced in making connections. It is advisable to connect the filament batteries first and make sure that the tubes light properly. Care must be used to have the right battery voltage for the tubes to be used. Radiotrons UV 201 require approximately 5 volts which may be supplied by a 6-volt storage battery. Three or four 22½-volt "B" batteries connected in series are also required. Both the filament and "B" batteries may be used for the detector and audio frequency amplifier as well as for the radio frequency amplifier.

OPERATION

There are no tuned circuits in the RADIOLA AR and therefore it is not necessary to readjust it except slightly when changing wave length. There are only two knobs near the lower part of the panel. The one on the right, marked "Fil. Rheo", controls the filament current to all the tubes which are permanently connected in parallel. In the "off" position, the knob is turned as far to the left as possible. This opens the filament circuit and the rheostat should always be left in this position when the set is not in operation. The knob on the left marked "Potentiometer" controls the grid bias of the first tube.

In operation, the tuner and detector amplifier are operated as usual. The filaments of the tubes in the AR should be lighted to the proper brilliancy. If the connections have been correctly made and all the apparatus is in proper condition, signals may be heard. The potentiometer controls the amplification and should be adjusted to give the maximum response without permitting oscillation to take place. After this adjustment is made, it need be changed only slightly.

MAINTENANCE

With ordinary care, the RADIOLA AR should last indefinitely. However, tubes and batteries will have to be replaced from time to time. The filaments of vacuum tubes gradually evaporate until there is no filament left when the tubes become useless. Filaments also break occasionally. Useless tubes should be replaced by new ones of the same kind.

Storage batteries may be recharged when they have become exhausted. Dry cells are of no value when exhausted. Since "B" batteries are usually made up of small dry cells they must be replaced by new ones.

TROUBLES

In case of trouble, see that the batteries are in good condition, that the tube filaments light to the proper brilliancy and that all connections are tight. If this does not remedy the trouble, renew both batteries and tubes. If the trouble still persists, call in a Service Man or a good Radio Electrician.

ELECTRICAL DESCRIPTION

Fig. 4 is a diagram of connections of the RADIOLA AR. The apparatus consists of three vacuum tubes, "A" "B" and "C" coupled by the trans-

formers "O" "P" and "Q." "D" is the potentiometer and "R" is the rheostat. "E" is a radio frequency bypass condenser.

The signal voltage from the tuner is applied between the grid and filament of the first tube "A". This causes changes in the plate current of tube "A" which flows through the primary "1-2" of transformer "O". This current induces voltage in the secondary "3-4" which is applied between the grid and filament of the second tube "B". "Q" is the final output transformer to the detector. "D" is a potentiometer which controls the steady voltage on the grid of tube "A" so that operation

will take place on the right part of the characteristic curve. "R" is a rheostat in the filament circuit which controls the filament current to all of the tubes. Condenser "E" makes it unnecessary for radio frequency currents to flow through the potentiometer. Condenser "S" provides a radio frequency by-pass around the "B" battery.

It will be seen that the output of the RADIOLA AR will be a radio frequency current of the same frequency and wave form as that of the current flowing in the antenna but of greater amplitude. This must then be supplied to a detector in order to be made audible.

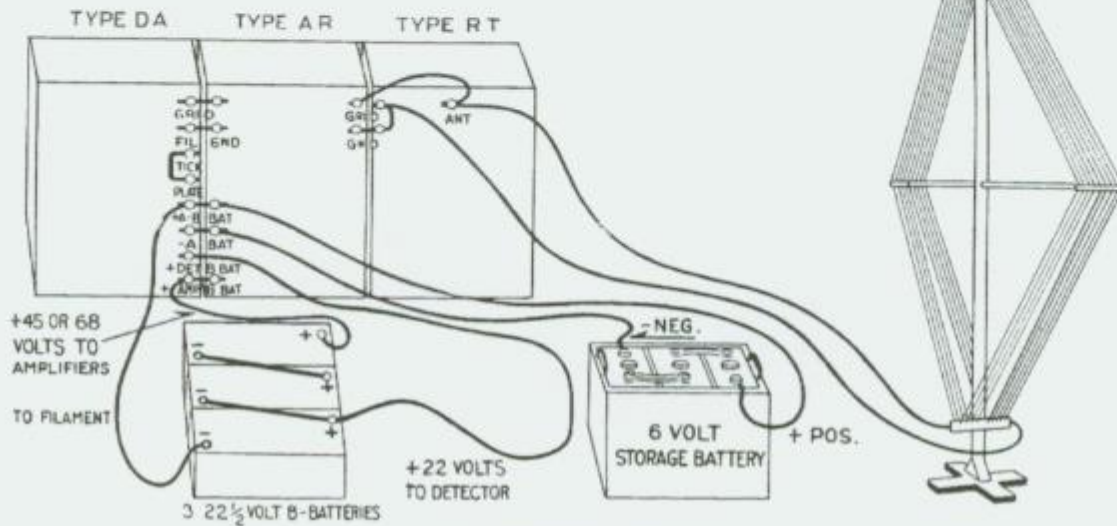


Fig. 1—Radiolas RT—AR—DA

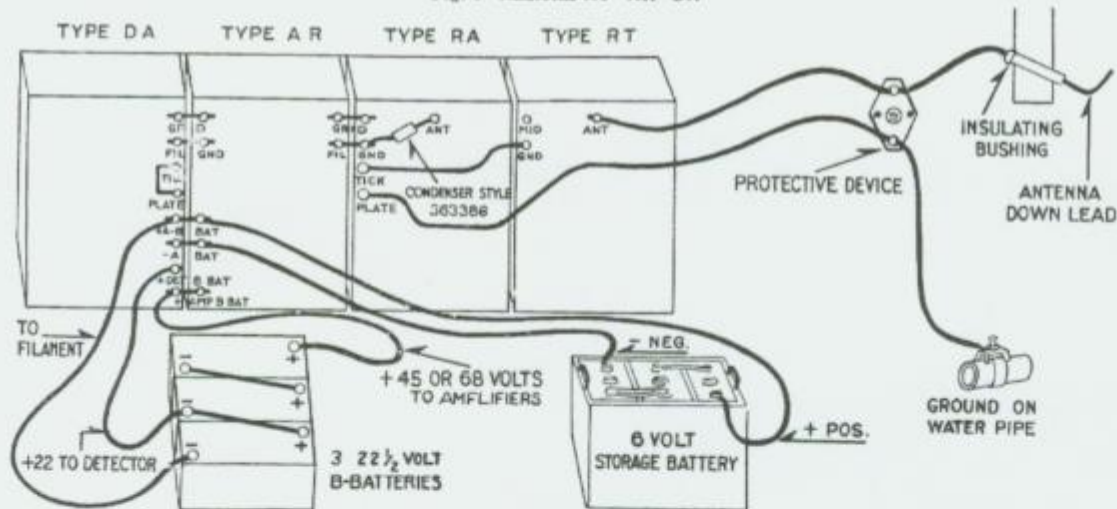


Fig. 2—Radiolas RT—RA—AR—DA

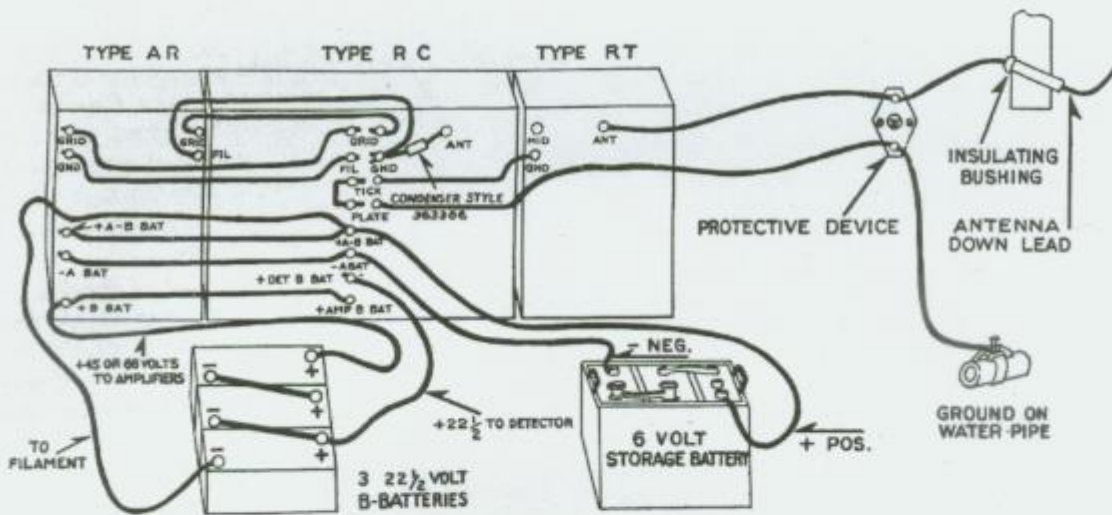


Fig. 3—Radiolas RT—RC—AR

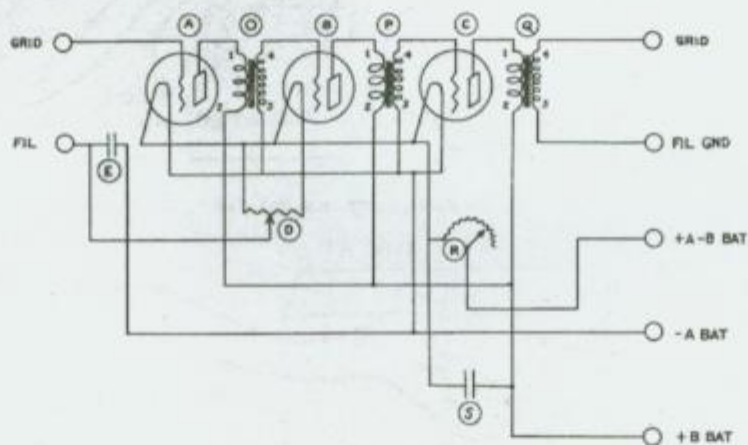


Fig. 4—Diagram of Connections of Radiola AR