Radiola III-A

INTRODUCTION

The Radiola III-A is a high grade regenerative radio receiving set especially designed for broadcast reception. It uses four WD-11 Radiotrons which are arranged to operate as a detector and two stage audio frequency amplifier. The second stage uses two Radiotrons in a balanced circuit particularly arranged to operate a loud speaker. By making the proper antenna connection a choice of two types of tuning circuit is afforded. One is a sensitive single tuning circuit that has made an excellent reputation in the Radiola Sr., while the other is a more selective circuit for use when interference is present. The apparatus is mounted below an attractive horizontal panel of durable moulded material and is enclosed in a solid mahogany case. A flexible cable is provided by which all battery connections are made, so that the set may be placed on a table while the batteries are placed on the floor or elsewhere out of the way.

EQUIPMENT

Furnished:

Under the name of Radiola III-A, there is included the following apparatus:

Radiola III-A Receiving Set as described
Four Radiotrons, Type WD-11
One Telephone Headset

Additional Material Needed:

To complete a new installation, the following items will also be needed.

A, B and C Batteries.
Loud Speaker, Radio Corporation, UZ-1325.
Complete Antenna and Ground Outfit.

BATTERIES REQUIRED

(A) Refers to Filament Lighting or "A" Battery
(B) Refers to Plate or "B" Battery
(C) Refers to Negative Grid Bias or "C" Battery

"A" Four or Six 1½ Volt Dry Cells connected in PARALLEL, such as:

4 to 6 Eveready Dry Cell Radio "A" Batteries or,
4 to 6 Manhattan Red Seal Dry Cells or,
4 to 6 Burgess #6 Dry Cells or,
4 to 6 Ray-O-Vac #1211 Dry Cells

NOTE—A two volt Storage Battery may be used if desired

OR EQUIVALENT

"B" Four 22½ Volt Plate Batteries connected in SERIES, such as:

4 Eveready #766 Plate Batteries or,
4 Burgess #2156 Plate Batteries or,
4 Ray-O-Vac #2151 Plate Batteries

OR EQUIVALENT

Two 45 Volt Plate Batteries may be used instead of four 22½ Volt blocks if desired, such as:

2 Eveready #767 Plate Batteries (45 Volts) or,
2 Burgess #2306 Plate Batteries (45 Volts) or,
2 Ray-O-Vac #2301 Plate Batteries (45 Volts)

OR EQUIVALENT

NOTE—The plate or "B" batteries listed are of the large sizes which are most economical. Other intermediate sizes may be used equally well.

"C" One 4½ Volt Negative Grid Bias or "C" Battery, such as:

1 Eveready #771 Negative Grid Bias Battery or,
1 Ray-O-Lite #231-R Negative Grid Bias Battery or,
1 Burgess #2370 Negative Grid Bias Battery

OR EQUIVALENT

INSTALLATION

Location:

The Radiola III-A should be placed as near as possible to the incoming lead from the antenna. A good ground such as a water pipe should be not far away.

When a loud speaker is used, most pleasing results will be obtained when it is used in a fairly large room which does not have bare walls, as draperies, hangings, irregular surfaces, etc., will prevent undesirable reflections of the sound waves.

Antenna:

Outdoor Type—In general, best results will be obtained with an outdoor antenna from 50 to 150 feet long and from 20 to 40 feet above the ground. If the suggested dimensions cannot be secured, approach them as nearly as possible. The antenna should be located in a space above the tops of surrounding buildings and trees or in a space as free from other objects as possible. It should not be touched by any object other than the antenna insulators. The same precautions apply to the lead-in wire which should preferably be a continuation of the antenna wire to eliminate joints, and should run as directly as possible to the receiver. The antenna should be at right angles to any electric light and other wires which may cause disagreeable noises, and if practicable at least 15 feet distant from them and from other antennae. It should be erected in a strong and durable manner in accordance with the requirements of the National Electric Code.

If an antenna is already available, it may be used provided that it is erected in accordance with the above instructions.

Indoor Type—For local reception, and in some locations for distant reception, satisfactory results may be secured by using 20 to 40 feet of ordinary double cotton covered magnet or bell wire (about #18 to 22 B & S gauge) strung around the picture moulding

or elsewhere as high up as possible. This type of antenna is particularly suitable for use in an apartment house or similar building.

Ground:

A good ground is as necessary as a good antenna. The best ground is a good electrical connection to a water pipe. If this is not convenient, a connection to the steam or hot water heating system will usually serve almost as well. Connections to gas pipes should be avoided. If nothing of this nature is available, a pipe or metal rod may be driven into the ground to a depth of several feet, preferably where the soil is moist. The ground connection should be made with a ground clamp, the wire being soldered or held securely by the clamping screw. In any case, the pipe must be scraped or filed until clean before making the ground connection. Usually, connecting to more than one ground, for instance to both water and steam pipes, will improve reception.

Batteries:

Three separate batteries are needed to operate Radiola III-A. The "A" battery heats the filaments of the Radiotrons, the "B" battery supplies the power to the plates for amplification and to operate the loud speaker, and the "C" battery controls the grid potential of the Radiotrons so that amplification will be undistorted and the drain of current from the "B" battery will be decreased.

The connection of these batteries may best be understood by reference to the diagram in Fig. 2. Remove the four WD-11 Radiotrons from their sockets while making the battery connections. In the center are shown five #6 dry cells. These are connected in parallel, that is, all the outside terminals are connected together by one piece of wire and then all the center terminals are connected together by another piece of wire. Under no conditions must these two wires touch each other or the cells will be ruined in a few minutes. The Radiola III-A is provided with a five conductor cable, one end of which is shown at the top of the figure. Each of the conductors has a braid of distinctive color. The one with the green braid with yellow tracer and the tag marked "—A+C" is to be connected to the negative side of the "A" battery formed by the four dry cells. It may be connected to any one of the outside terminals or to the wire which connects them together. The wire with the yellow braid with red and blue tracers and the tag marked "+A—B Gnd" is to be connected to the positive side of the "A" battery. It may be connected to any one of the center terminals or to the wire which connects them together. Be sure to make all connections tightly and securely. Before proceeding further with the batteries, unpack the four WD-11 Radiotrons from their cartons. Turn both knobs marked "Battery Setting" as far to the left as possible or until the pointer rests on "OFF". Then insert the WD-11 Radiotrons in their sockets which are located below the openings in the panel. The Radiotrons can be inserted in but one way and that is with the large pin toward the front of the set. **Push them down firmly.** Then turn both "Battery Setting" knobs about a quarter turn to the right. By looking directly down into each Radiotron, the dull red glow of the filament should be visible. It will probably be necessary to darken the room or at least shield the Radiotrons from direct illumination to see the glow of the filaments. If any filament does not glow see that the Radiotron is firmly in its socket, and if the trouble persists, try it in one of the other sockets in place of a Radiotron which does glow. If it still fails to glow, the filament is broken and it is of no more use. Having determined that all filaments are glowing, turn the "Battery Settings" back to "OFF" to conserve the filament battery.

Then proceed with the "B" battery which is shown to the right of the figure as consisting of four of the usual 22½ volt blocks. These are connected in series, that is, the positive of block number 1 to the negative of block number 2. To do this, provide four pieces of wire about 8 inches long. Arrange the blocks about as shown. Call the one to the left number 1. One terminal (negative) of this block will be marked "—" or " NEG". Connect this to a positive terminal on the "A" battery. The other terminal (positive) of this block (number 1) will be marked "+", "+22½" or "Pos". Connect it to the negative terminal of block number 2. Also connect the positive of block number 2 to the negative of block number 3, and the positive of block number 3 to the negative of block number 4. One of the cable leads has a maroon braid and a tag marked "+ 20 B". Connect it to the positive terminal of block number 1. Another cable lead has a red braid and a tag marked "+ 80 B" Connect it to the positive terminal of block number 4.

The "C" battery consists of a 4½ volt battery especially designed for this purpose. One terminal is marked "+" or "Pos". Connect this by a short piece of wire to a negative terminal on the "A" battery. Connect the remaining cable lead with black braid and green tracer and with the tag marked "—C" to the terminal marked "—4½".

The wire to the ground connection should be connected to a positive terminal on the "A" battery. It may not be convenient to connect so many wires to the same battery terminal but it is permissible to distribute them over several of the center terminals so long as they all remain connected together.

Great care should be taken to keep the battery connections tight, as failure to do so may result in objectionable noises, or complete inoperation of the set.

OPERATION

Controls:

Battery Setting—The two knobs so marked serve to turn on and control the current flowing through the filaments of the Radiotrons. When the set is not in use, both pointers should be turned as far as possible to the left so that they rest on "OFF". The knob in the center of the panel controls the filament current to the two Radiotrons to the right while the knob at the left front corner controls the two Radiotrons immediately behind it.

Station Selector—The control so marked serves to adjust the tuning circuit so that it will respond to the desired wavelength. The long handle makes accurate tuning easy.

Amplification—The control so marked adjusts the regeneration and thus regulates the sensitivity and selectivity of the set.

Regeneration is obtained by the tickler method and the construction is such that changing the adjustment of the regeneration causes no appreciable change in the tuning.

Antenna Binding Posts—There are two types of circuit available. One is a straight single circuit noted for its sensitivity and ease of operation. The other is a type of coupled circuit affording more selectivity. Either may be had at will by connecting the antenna to the proper binding post and putting the link in the proper position. Fig. 3 shows the suggested combinations which have the following properties.

No. 1. Antenna on 4, link open. This is a single circuit connection which on an average antenna will cover the approximate wavelength range of 200 to 360 meters corresponding to a frequency range of 1500 to 830 kilocycles.

No. 2. Antenna on 3, link open. This is a single circuit connection which on an average antenna will cover the approximate wavelength range of 250 to 480 meters corresponding to a frequency range of 1200 to 625 kilocycles.

No. 3. Antenna on 2 and 3, link open. This is a single circuit connection which on an average antenna will cover the approximate wavelength range of 315 to 560 meters corresponding to a frequency range of 950 to 535 kilocycles.

No. 4. Antenna on 2 and 3, link on 4. This is a closed single circuit which on a very small antenna, such as an indoor one, will cover the approximate wavelength range of 290 to 575 meters corresponding to a frequency range of 1070 to 520 kilocycles.

No. 5. Antenna on 1, link on 4. This is a selective single circuit connection which on an average antenna will cover the approximate wavelength range of 195 to 375 meters corresponding to a frequency range of 1540 to 800 kilocycles.

No. 6. Antenna on 1, link on 3. This is a selective single circuit connection which on an average antenna will cover the approximate wavelength range of 310 to 640 meters corresponding to a frequency range of 970 to 470 kilocycles.

Finding Signals:

Select a suitable antenna connection according to one of the combinations shown in Fig. 3. Generally, the first trial may be made using the single circuit connection with the intermediate wavelength range, the second combination from the left. If a loud speaker is to be used, push its cord terminals into the pin jacks on either side of the word "Output" at the left of the panel. Then turn both "Battery Setting" knobs to the right until the filaments of all four Radiotrons glow at a dull red color. If a headset is to be used, push its cord terminals into the pin jacks just above the words "1st stage" near the front of the panel, and then turn only the "Battery Setting" near the middle of the panel until the filaments of the two Radiotrons at the right, glow at a dull red color. The pin jack at the left is positive. The cord tip on the lead with the colored tracer thread should be inserted in this jack. The other "Battery Setting" should be left in the "OFF" position, unless the loud speaker is used. Then set the "Amplification" at about "3". Turn the "Station Selector" slowly back and forth over the scale. If signals are heard, carefully adjust the "Station Selector" until the signals become loudest and then turn "Amplification" to the right when the signals should become still louder. Do not turn "Amplification" to the point where the signals become distorted or where whistles and howls are produced. If no signals are heard the first time, turn "Amplification" one half division to the right and try again. Continue this procedure until results are obtained. If the first antenna combination fails, try another.

When "Amplification" is turned too far to the right, the set will oscillate. This condition will be apparent by a breathing noise and usually by whistling noises, the pitch of which varies as the "Station Selector" is turned slightly. The proper operating point is just before the set starts to oscillate. After a little practice, it will be possible to tell when this condition prevails. Then the proper procedure in finding signals is to turn "Amplification" up to the proper point and then turn "Station Selector" until signals are heard. Careful adjustments of both "Station Selector" and "Amplification" will be needed to obtain maximum strength of signals.

The maximum sensitivity is obtained when a regenerative receiving set is adjusted so that it is just ready to oscillate. With some antennae, it may be difficult to reach this condition, which is indication that the antenna has very high resistance and should be improved. Oscillation should occur before "Amplification" reaches "10". When a set is oscillating, strong whistling noises are produced, whose pitch varies as the "Station Selector" is turned. Also, much of the static and other interference is stopped but a characteristic breathing sound is produced. It becomes much more difficult to tune in a station and it is impossible to get good, clear reception so that oscillation is to be avoided.

ALSO IF THE RECEIVER IS ALLOWED TO OSCILLATE IT WILL DISTURB OTHER NEARBY RECEIVERS AND THEREFORE CARE SHOULD BE EXERCISED TO AVOID THE OSCILLATING CONDITION, AND WHENEVER THE RECEIVER DOES OSCILLATE ACCIDENTLY, THIS SHOULD BE STOPPED IMMEDIATELY BY TURNING THE AMPLIFICATION CONTROL BACK TO THE PROPER POINT.

In case it is impossible to make the set oscillate on all antenna combinations, disconnect the maroon cable lead (+20B) from the positive terminal of the first block of the "B" battery and connect it to the positive terminal of the second block (+40 volts).

SOME CAUSES OF FAULTY OPERATION

Filaments fail to glow—"A" battery may be exhausted: One of the leads may be disconnected: One Radiotron or more may not be making contact in the socket: The filament may be broken: Connections may be loose: The remedy is obvious in each case.

No sound is heard—The filaments may not be lighted: The "B" battery may be disconnected or the leads reversed: The "B" battery may be exhausted: The leads to the loud speaker or head set may not be connected: The "C" battery may be disconnected If slight noises are heard but no signals, no station within range is operating.

Howling noise—The antenna may be disconnected or the link may be open when it should be closed: "Amplification" may be turned too far to the right: The Bias battery may be nearly exhausted.

Music or Speech Distorted—The bias battery connections may be reversed: The "B" battery may be exhausted.

MAINTENANCE AND REPLACEMENTS

Radiotrons:

Occasionally a Radiotron will become inoperative on account of a broken filament or a cracked or broken bulb. When this happens, it should be replaced by a new one of the same type. Occasionally after many hours of service (about 1000) a Radiotron will lose its sensitivity. It will usually pay to obtain a new one when this happens.

In emergency cases, the set may be operated with only one Radiotron in the group at the left. This Radiotron may be used equally well in either socket. The quality of reproduction is much better when four tubes are used, however.

Filament or "A" Battery:

When the dry cells used for this purpose become discharged to the point where they will no longer heat the filaments to the proper temperature, they should be replaced by new ones.

The batteries may be replaced by disconnecting all wires from battery binding posts. Then the cells may be removed and new ones connected in their places. Attached to each lead is a marked metal tag designating to which point the lead is to be connected. Reference to Fig. 2, will preclude the possibility of an error in connection, and will warrant careful attention. The carbon or center post of a standard dry cell is positive.

DON'T FORGET TO REMOVE TUBES FROM SOCKETS BEFORE REPLACING ANY BATTERIES. NEVER BURN TUBES MORE BRIGHTLY THAN REQUIRED FOR A REASONABLE SIGNAL.

"B" Battery:

It is rather difficult to know when these batteries are exhausted, as there is no external indication except weakened signals. The best way is to obtain a reliable voltmeter which will indicate up to 100 volts at least and take weekly readings of your batteries. Discard each block when the voltage per block falls to 17 volts.

Bias or "C" Battery:

This battery should be replaced whenever its voltage falls below 4 volts to insure the proper functioning of the Radiola III-A. This procedure may be carried out readily by reference to Fig. 2. This battery, if of the kinds given in the list recommended, should last at least six months.

When asking for information about, or for repair parts for, or when reporting troubles with these sets, please mention the serial number which may be found on the bottom of the box.

A complete diagram of connections is given in Fig. 4.

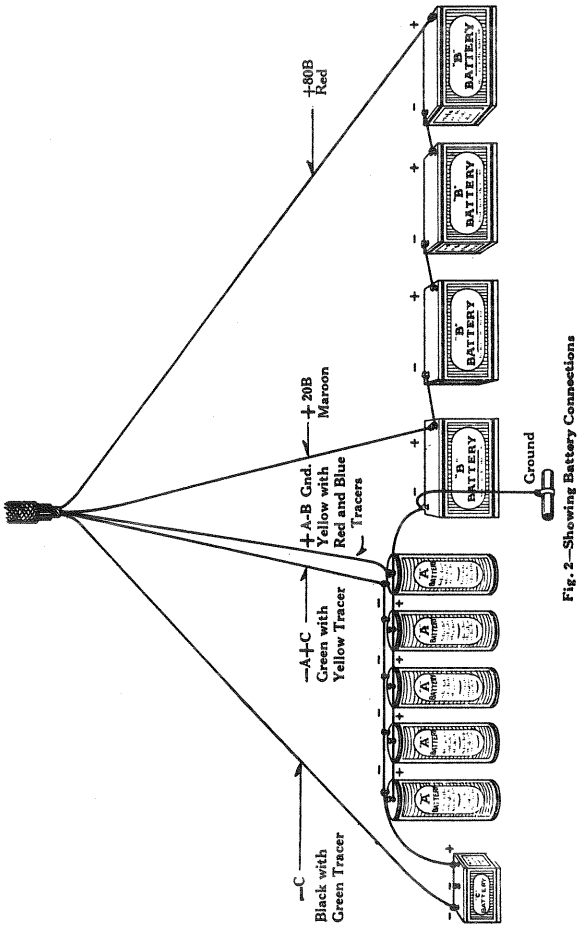

Fig. 2—Showing Battery Connections

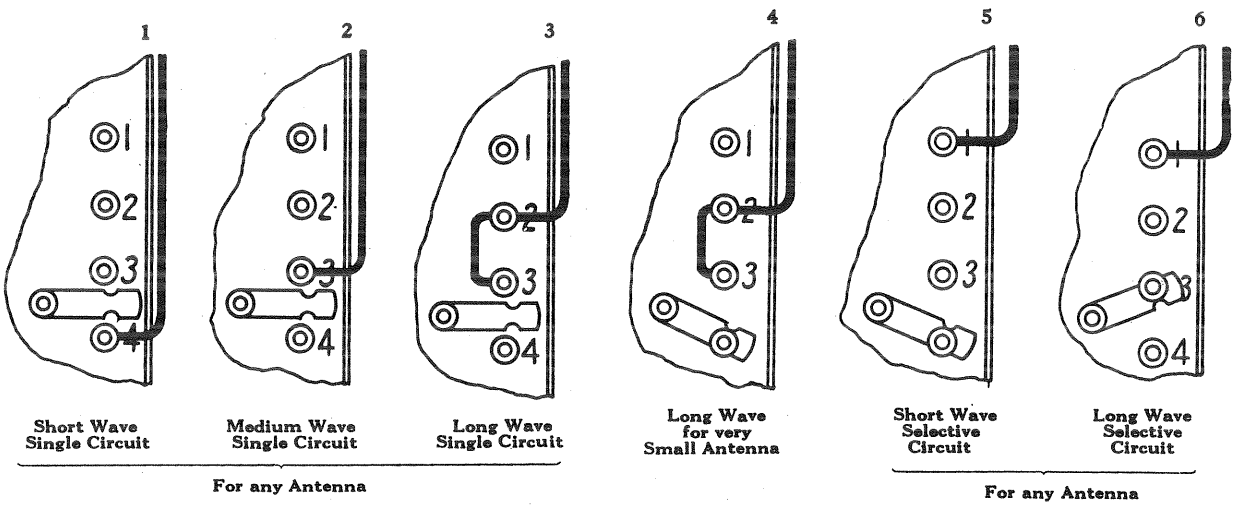

Fig. 3—Showing Antenna Connections to Different Binding Posts

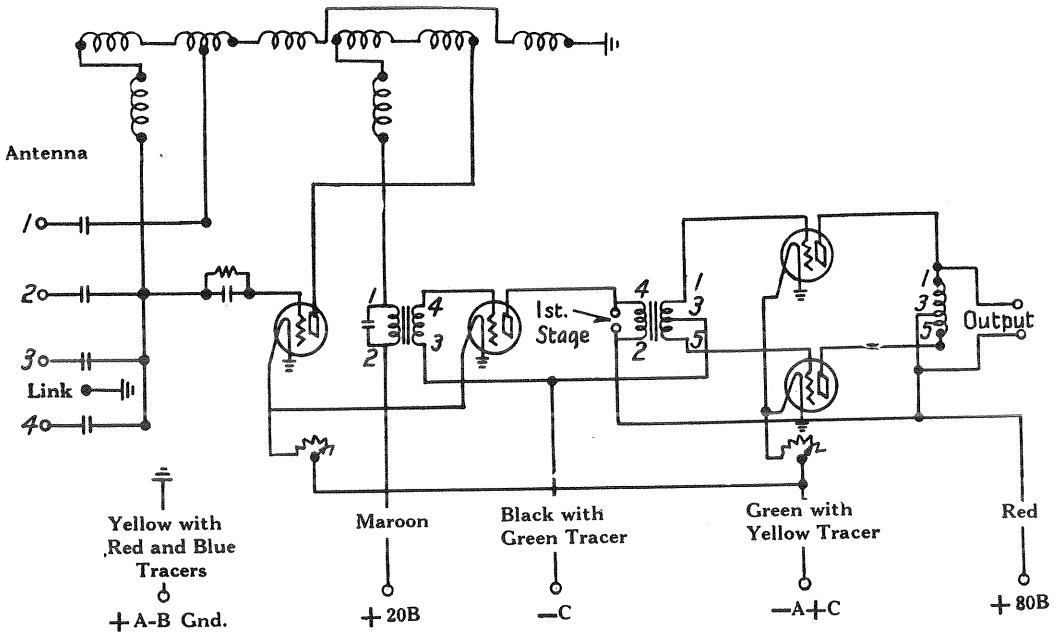

Fig. 4—Diagram of Connections