RADIOLA 25

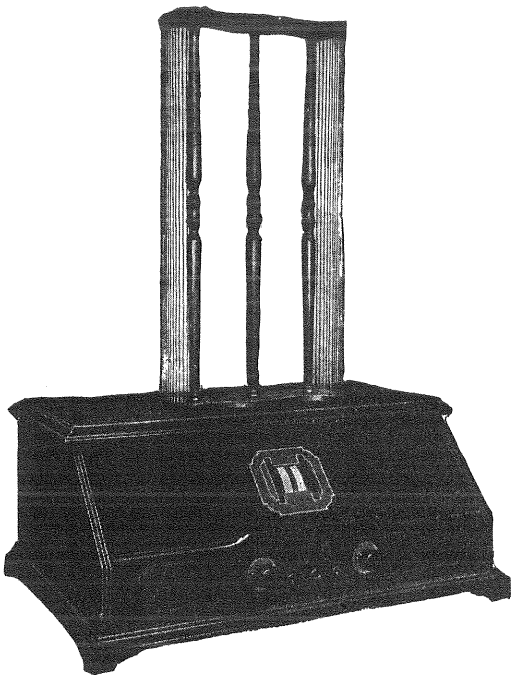
(Reg. U. S. Pat. Office)

(BATTERY OPERATED)

SERVICE NOTES

NS—25-2

Second Edition—November, 1926



RADIO CORPORATION OF AMERICA

Prepared by

NATIONAL SERVICE DIVISION

233 Broadway, New York City

DISTRICT SERVICE STATIONS

326 Broadway
New York City

10 South La Salle Street
Chicago, Ill.

3308 Fourteenth Street, N. W.
Washington, D. C.

28 Geary Street
San Francisco, Cal.

A Word or Two About Service

Service goes hand in hand with sales. The well informed Radiola Dealer renders service at time of sale in affording information as to proper installation and upkeep. Subsequent service and repair may be required by reason of wear and tear and mishandling, to the end that Radiola owners may be entirely satisfied.

Obviously this service can best be rendered at point of contact and therefore Dealers and Distributors, who are properly equipped with a knowledge of the design and operation of Radiolas, occupy a favorable position to contract for this work.

To assist in promoting this phase of the Dealers' business the National Service Division of the RCA has prepared a series of Service Notes—of which this booklet is a part—containing technical information and practical helps in servicing Radiolas.

This information has been compiled from experience with Radiola Dealers' service problems, and presents the best practice in dealing with them. A careful reading of these Service Notes will establish their value to Dealer and Distributor, and it is suggested they be preserved for ready reference.

In addition to supplying the Service Notes the RCA, through its Service Stations, has available to Dealer and Distributor the services of engineers who are qualified to render valuable help in solving service problems.

RADIOLA 25 SERVICE NOTES

(Battery Operated)

Prepared by

RCA NATIONAL SERVICE DIVISION

NS—25-2

INTRODUCTION

Radiola 25 is a radio broadcast receiver of the super-heterodyne type employing the standard six-tube circuit. As used in Radiola 25 this proven circuit provides ease of tuning, selectivity, sensitivity and ample loudspeaker volume. Five Radiotrons UX-199 and one Radiotron UX-120 are used. Provision is made for all batteries to be placed in the compartment with the tuning apparatus, thus making a complete self-contained receiver.

Seals: The lead seals placed on the catacomb of Radiola 25 are for the protection of the dealer. Broken seals indicate tampering. The special parts that go to make up the catacomb are impregnated in a wax compound and it is neither advisable nor practicable to attempt repairs without proper equipment.

If tests indicate a defective catacomb replace it with a new one, returning the defective one through regular channels to the nearest RCA Service Station. No marks of any kind should be made on the catacomb. To indicate the defect in the catacomb for future reference, attach tag to catacomb and note thereon observed defect.

(1) RADIOTRON SEQUENCE

Facing the panel and counting from right to left the input is brought into the first Radiotron, which is a stage of tuned radio frequency amplification.

The output of the first Radiotron then goes to the second tube from the right, which acts as a first detector and oscillator combined. At this stage the beat or intermediate signal frequency is formed which now is reflexed to Radiotron No. 1. This Radiotron, while acting as a stage of tuned R.F., also is the 1st intermediate frequency stage.

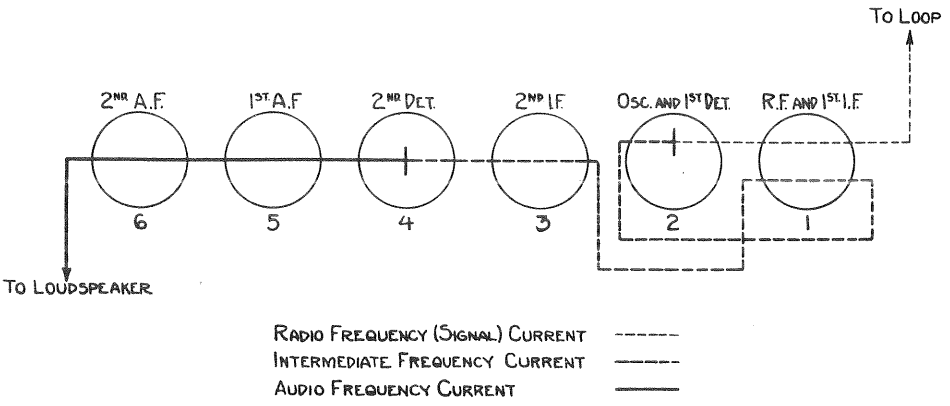


Figure 1—Radiotron Sequence

From Radiotron No. 1 the intermediate frequency signal now goes to Radiotron No. 3, which is the 2nd stage of intermediate amplification.

The signal is now fed into the second detector, or Radiotron No. 4, where it changes to audio frequency current. Radiotron No. 5 and No. 6 are the first and second stages of audio frequency amplification, respectively, and the signal is made available at either stage by connecting the speaker to the proper jack. Fig. 1 illustrates the Radiotron sequence and the path of the different currents through them.

(2) RADIOTRON SOCKETS

In placing Radiotrons in the gang sockets care should be exercised to make certain that the two large pins and two small pins of the Radiotrons are placed into the two large and two small holes respectively of the sockets. If a Radiotron will not fit into a socket without considerable pressure being applied, the trouble is probably due to excessive solder on one or more of the prongs. This may be removed with a file or knife. Never try to force one in. These sockets are so designed that the prongs of the Radiotrons will fit in snugly without force being applied. If sufficient force is applied it might be possible to insert the prongs in the wrong holes, resulting in a filament burnout.

(3) LOOP SOCKET

Great care should be taken to see that the loop is firmly seated in its socket as under certain conditions the "A" and "C" batteries may become short circuited by the contact spring of the loop *plug* shorting the contact spring of the *socket* to the metal collar of the socket if the loop plug is not properly seated.

(4) LOOP NOT VERTICAL WHEN SEATED

The position of the loop may not be exactly vertical although properly seated. To correct this condition remove loop and open lid. Loosen the four machine screws that hold the loop socket collar assembly in place on the horizontal platform of the frame. It will be noted that the construction of the upper and lower portions of the loop socket assembly is similar. When loosening these four screws, hold the nuts from turning. Having loosened the screws the entire loop socket assembly may be rotated in an area sufficient to enable the centering of it directly below the bezel ring in the lid of the cabinet. With the lid closed insert the loop and force it into a vertical position by applying pressure to the center spindle. When a vertical position is thus attained, remove loop from the socket, taking great care not to move the socket assembly from its new position. The four screws may now be tightened and the loop will remain vertical providing the new position of the socket assembly was not altered when removing the loop.

(5) LOOP OPEN

When the left hand drum has no apparent effect on tuning, look for an open loop. In some instances the loop leads perhaps are not properly soldered to the prongs of the loop terminal, or have jarred off in shipment. Make usual battery test across the two outside prongs for continuity of loop. It must be recognized, however, that there is a possibility of the loop circuit being open below the lid (broken pig tail of loop tuning condenser, etc.), but the place mentioned is the most likely source of trouble.

(6) LOOSE RHEOSTAT CONTACTS

To get at this source of trouble, with the loop taken out, remove set from cabinet by removing the four outside screws in the bottom of the cabinet. Apply pressure to back of set until panel moves forward sufficiently to enable the service man to support it with his fingers. It may now be gently pulled out, taking care not to permit the metal frame work to mar the finish by riding on the front base of the cabinet.

The square head set screw holding the rheostat arm to the shaft may now be loosened and the contact arm readjusted or removed and bent so that it will make positive contact with the resistance strip. Make certain that the resistance strip is clean where contact is made. Test "A" batteries to see that they are up to their proper rating. Insert voltmeter leads in the two pin jacks in the lower right hand corner of the front panel. Set "Volume Control" at "Loud." Adjust the "Battery Setting" knob to a quarter scale division beyond 3. Holding this in place, adjust the rheostat contact arm until a reading of 3 volts is obtained on the voltmeter. Tighten set screw to hold contact arm in this relative position and replace set in cabinet.

(7) OUTER EDGE OF DRUM CONTROL WHEEL SCRAPING AGAINST ESCUTCHEON PLATE OF PANEL

The adjustment of control drums in this condition is attended by noisy reproduction in the loudspeaker, and may be due to either or both of the following causes:

(1) *Warped control wheel.* Check by placing a straight edge on the outer flat surface of the knurled control wheel and noting the flatness of the surface by slowly rotating the wheel. Replacing with a new wheel or a slight filing of the escutcheon plate will correct this trouble.

(2) *Condenser improperly aligned.* To correct this condition remove front panel and adjust the mounting screws of the condenser. The two mounting screws that hold the back end plate of the condenser pass through elongated holes in the aluminum frame thus allowing a degree of play sufficient for adjustment purposes.

(8) SCRAPING DRUMS

Sometimes, due to warping of the control wheels, the metal drums of the Station Selectors will touch. This will cause a grating noise in the loudspeaker whenever the drums are adjusted. When this occurs the hex. nuts holding the drums to the condenser shaft should be loosened and the drums adjusted for clearance. The nuts should then be tightened. If this will not remedy the trouble, the points touching should be filed with a small file until ample clearance is provided.

(9) DRUMS FAIL TO HOLD POSITION

Should an adjustment be necessary due to the tuning drums slipping their position the following procedure should be used:

(a) Remove set from cabinet and readjust tension screw on the inside of the drum. Some models have only one counterweight, relying on a friction shoe to hold the other drum from slipping. Other models, however, are equipped with a counterweight on both condensers, the friction shoe only being used to hold the opposite condenser in relative position when one is moved. The tension screw referred to controls the pressure of this shoe against the opposite drum. If one drum turns too hard when the other is held, the tension screw should be slightly loosened.

(b) When the frequency range is off calibration, ascertain whether or not the drum control is in proper relation to the condenser plates. When the drum control is set for minimum frequency (maximum wave length) the rotor plates should be entirely inside the stator ones. Provision is made on some models to key the drum to the condenser plates, thus eliminating the possibility of incorrect frequency calibration due to slipping of the drum control.

(10) D.C. BUS BAR ON REAR OF CATACOMB

The screws holding this bus bar must always be kept tight, otherwise intermittent reception or complete failure to operate may result. This bus bar is a vital part of the filament circuit, connecting the filaments in parallel for dry battery operation. Occasionally the screws holding it in place will work loose in shipment.

(11) OSCILLATION

Should Radiola 25 oscillate, causing squeals and howls, it is usually an indication of excessive filament voltage or a defective catacomb. The battery voltage should never exceed 3.3. This can best be checked by connecting a voltmeter at the pin jacks on the panel. The point where the filament voltage is 3.3 should be noted on the "Battery Setting" dial and this point used as a maximum point for operation.

If it is determined that the catacomb is defective it should be replaced. However, before it is changed, all other circuits should be checked to ascertain their operating condition.

(12) WEAK SIGNALS DUE TO HIGHLY SHIELDED LOCATION

There will be found an occasional location so badly shielded that an external pickup will be necessary. Installations in steel buildings are at times troubled with this shielding effect and make necessary the erection of a short antenna, not over 25 feet or so in length outside the building. Insulated wire should be used and may be conveniently hung out of a window, although it would be better to get it away from the absorbing effect of the building, if possible. This antenna should be inductively coupled to the loop of Radiola 25 by winding a few turns of the lead-in (which should be a continuation of the antenna itself) to a diameter of about eight or nine inches and placing this coil standing up behind the set. It may conveniently be placed against the back of the set.

Enough wire should be left over after forming this coupling coil to serve as a ground lead, connecting same preferably to a cold water pipe by means of an approved ground clamp. It will be noted that no connections are made in this length of wire from the far end of the antenna until connected to ground. Thus installed we have a low resistance antenna conveying the Radio waves to an aperiodic coupling coil, to be picked up by the loop of Radiola 25 and transmitted to the set in the usual manner. The loop, of course, loses its directional effect, but the loop tuning condenser calibration remains unchanged.

(13) TEST FOR PROPER BATTERY CONNECTIONS

Disconnect battery connection strip from catacomb terminal board by loosening the screws holding it in place. Battery readings may then be taken directly across the various terminals by a high resistance type voltmeter. If the batteries are properly connected and in good condition the following voltmeter indications illustrated should be obtained with the correct polarity:

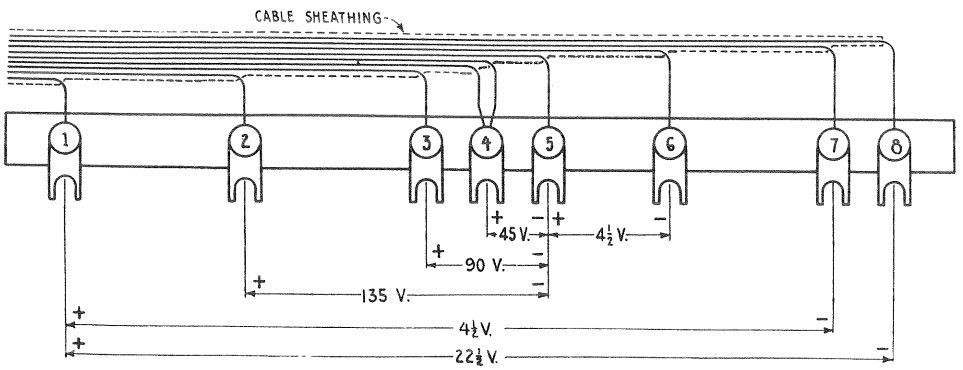


Figure 2—Radiola 25 Battery Terminal Strip

(14) INSTALLATION OF BATTERIES

Care must be taken to install the two 22½-volt batteries and 4½-volt battery at the left of the cabinet so that their terminals face *up* or *forward* towards the panel. There is a possibility of the metal frame shorting the batteries if they are faced in toward the frame.

(15) LOUDSPEAKER POLARITY

In Radiolas employing Radiotron UX-120 in the last audio amplification stage it is very important that the loudspeaker be so connected that the magnetic field generated by the relatively large plate current from the 135-volt B battery will not oppose the permanent magnetic field of the speaker pole pieces. In Radiola UZ-1325 loudspeakers, one of the leads is brown, the other black with a brown tracer. The solid brown lead should be connected to the *tip* of the phone plug and the black lead with brown tracer to the *sleeve* of the phone plug. In Radiolas it is standard practice to connect the phone jack in such a manner that the tip of the phone plug will go to the plate of the audio amplifying Radiotron and the sleeve to the positive (+) B battery terminal. If electromagnetic speakers similar to the UZ-1325 are incorrectly connected, they will soon loose their sensitivity through a weakening of the permanent magnetism of the pole pieces. When the leads are properly connected, the magnetic field generated by the steady plate current in the speaker coils intensifies the permanent magnetic field of the pole pieces and maintains the permanent magnetism.

If there is doubt of the correct connection, loudspeakers with metallic diaphragms such as UZ-1325 should be so adjusted that the diaphragm just strikes the actuating magnets or pole pieces as will be evidenced by a clattering noise when loudest notes are played. Reversing the loudspeaker leads will either accentuate or lessen the clattering. That connection which gives greatest clattering is the correct one to use. The speaker should then be readjusted so that no clattering occurs on the greatest volume desired.

In Radio Loudspeaker Models 100, 102 and 104 however, the polarity is not an important factor. They should accordingly be connected in the manner that gives the most pleasing reproduction.

(16) CATACOMB AND PANEL CONTINUITY TESTS

In making the tests for continuity of both external and internal connections of the catacomb both filament control and volume control rheostats should be adjusted so that half the resistance is in the circuit, the loop connections opened and the power supply cable disconnected from the terminal strip at the rear of the catacomb.

A pair of headphones with at least 4½ volts in series (See Figure 3) or a voltmeter with voltage sufficient to give full scale deflection when connected directly across battery terminals should be used in making these tests. This arrangement will be found to be very sensitive in checking voltage drop in various circuits.

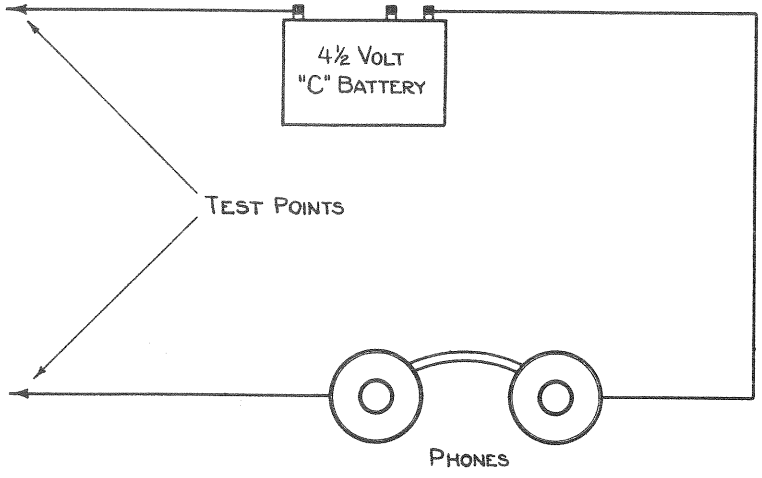


Figure 3—Click test circuit

The contacts of the test equipment should be placed across the terminals indicated under the column marked "Terminal" (see page 9) and the results should be as indicated under the column marked "Correct Effect." If the results are negative the cause of such negative effect will be found in the last column under the heading "Defect." The first column indicates the circuit under test.

The numbers of the terminals referred to in these tests apply to the terminals on the connecting strip at the rear of the catacomb frame assembly. The designation "P" and "G" refer to plate and grid contacts of the socket indicated by the number following. For example G2 would indicate the grid contact of the second socket; P6 would indicate the plate contact of the sixth tube socket. The coil numbers referred to in the right hand column will be found in Figure 4.

Catacomb Test (Coils and Connections)

Circuits	*Terminals*	*Correct Effect*	*Defect*
Grid	G1 to 7	Closed	Open ½ coil No. 1
	G2 to 5	Closed	Open coil No. 4
	G3 to 7	Closed	Open coil No. 6
	G4 to 12	Closed through grid leak	Open grid leak or coil No. 8
	G5 to 7	Closed	Open coil No. 10
	G6 to 6	Closed	Open coil No. 12
Plate	P1 to 14	Closed	Open coil No. 3 or No. 5
	P2 to 4	Closed	Open connections
	P3 to 14	Closed	Open coil No. 7
	P4 to 13	Closed	Open coil No. 9
	P5 to 15	Closed	Open connections
	P6 to 18	Closed	Open coil No. 11
	14 to 3	Closed	Open coil No. 2
—Filament	—F1 to 9	Closed	Open connections
	—F2 to 9	Closed	Open connections
	—F4 to 9	Closed	Open connections
	—F5 to 9	Closed	Open connections
	—F6 to 9	Closed	Open connections
+Filament	+F1 to 12	Closed	Open connections
	+F2 to 12	Closed	Open connections
	+F3 to 12	Closed	Open connections
	+F4 to 12	Closed	Open connections
	+F5 to 12	Closed	Open connections
	+F6 to 12	Closed	Open connections

Catacomb Test (Condensers)

Circuit	*Terminals*	*Correct Effect*	*Defect*
Grid	G1 to 1	Open	Shorted condenser No. 1
	G1 to P1	Open	Shorted condenser No. 7
	G4 to 19	Open	Shorted condenser No. 5
	G5 to P5	Open	Shorted condensers Nos. 2 and 3
	G5 to G6	Open	Shorted condensers Nos. 2 and 4

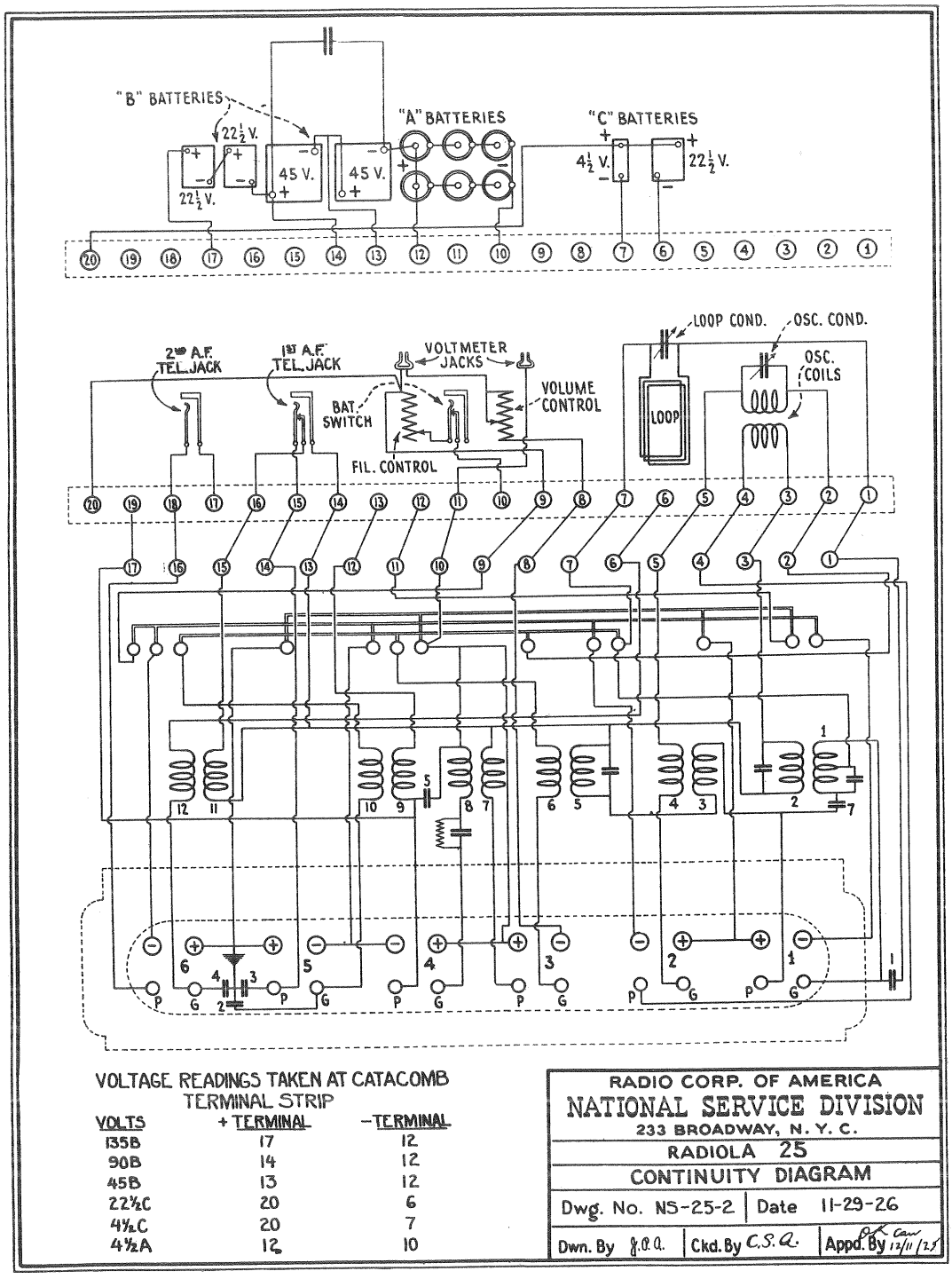


Figure 4—Radiola 25 continuity diagram

Panel Test

Circuits	*Terminals*	*Correct Effect*	*Defect*
Loop	1 to 7	Closed	Open loop
Grid	2 to 5	Closed	Open grid coil of oscillator
Plate	4 to 3	Closed	Open plate coil of oscillator
Filaments	9 to 10	Closed	Open filament rheostat
	8 to 9	Closed	Open volume control

Panel Test (Condensers)
(Loop Removed)

Circuit	*Terminal*	*Correct Effect*	*Defect*
Loop	1 to 7	Open	Shorted loop tuning condenser

FILAMENT POLARITY OF SOCKETS

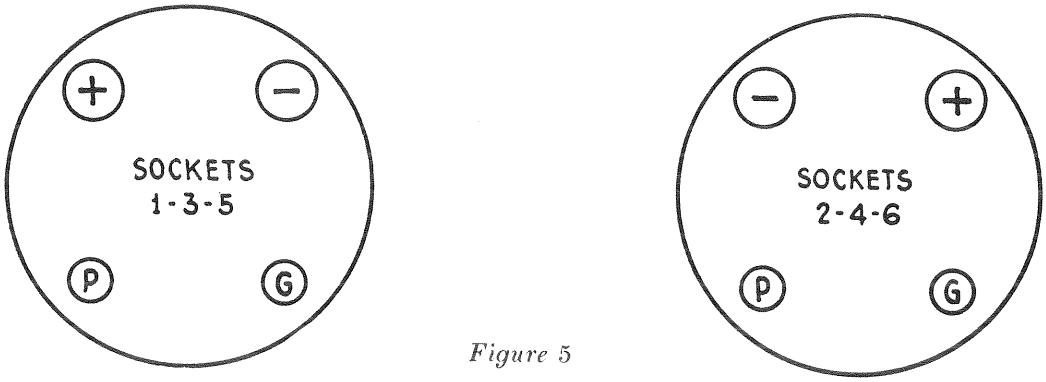


Figure 5

If the catacomb fails to pass any of the above tests it should be removed from the panel and replaced by a new one. Under no circumstances should the lead seals on the cover plate be broken. No marks of any kind should be made on the catacomb. To indicate the defect in the catacomb for future reference, attach tag to catacomb and note thereon observed defect.


RCA