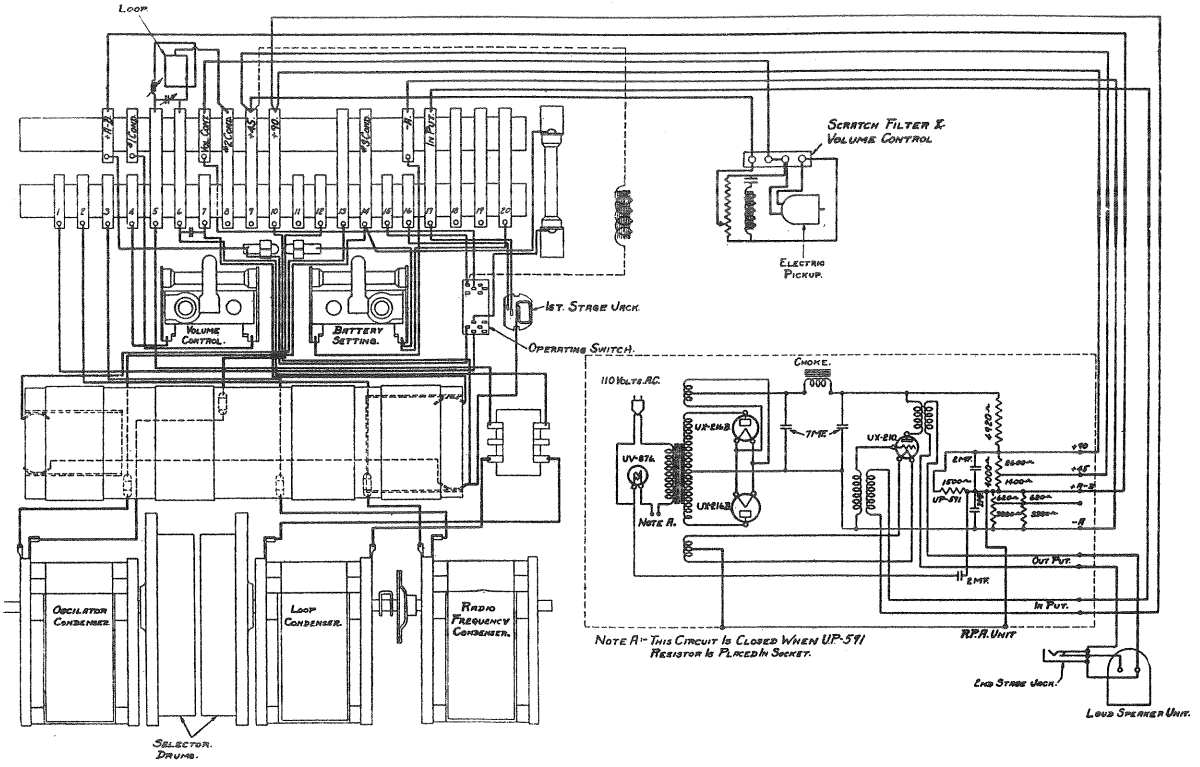
Victor Model 9–2 (Borgia II)



Wiring Diagram for Borgia II

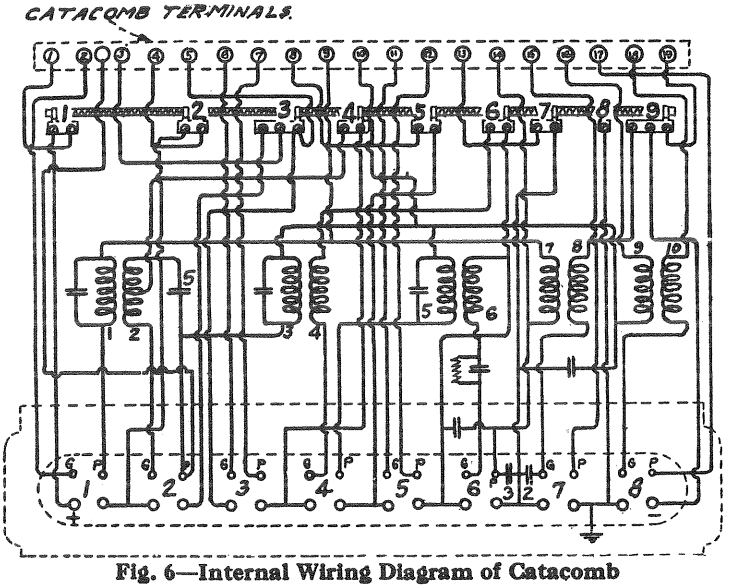


Fig. 6—Internal Wiring Diagram of Catacomb

PICKUP AND AMPLIFIER SAME AS MODEL 8—60

VICTOR RADIOLA 28

(AC Operated)

The Radiola used in combination with the Electrola in models Borgia II (9-2), Hyperion (15-1), 9-40, 9-25 and 9-55, is an eight tube superheterodyne receiver, employing a loop antenna for signal pickup and obtaining its D. C. operating current from an A. C. source through a rectifier-power-amplifier device.

Figure 1 shows in diagramatic form the sequence of tubes in the circuit, and the paths followed by the various currents which are denoted as follows:

. . . . . Incoming Frequency
- - - - - - - - Oscillator Frequency
. . . . . Intermediate Frequency
——— Audio Frequency

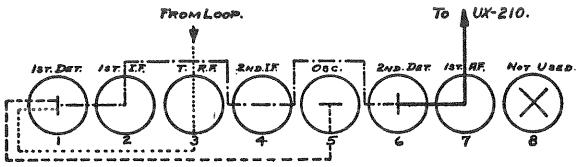


Fig. 1—Radiotron Sequence

(Borgia II reversed end for end)

If the difficulty encountered does not render the radio entirely inoperative the cause of the trouble and its remedy will be found under Sections 24 to 32 of this bulletin. Otherwise the following procedure should serve to isolate the cause of the trouble.

1. Remove back panel and note whether or not the tubes in the power-amplifier unit are lit, and that the ballast tube is operating correctly as indicated by considerable heat dissipation.

2. Should all Radiotrons and Rectrons fail to operate, look for:

a. House lighting current not on or loose connection at outlet.

b. Defective UP-591 resistor.

c. Burnt out filaments of ballast tube or poor contact in socket.

d. Operating switch not making contact.

3. If the ballast tube glows excessively but other Radiotrons and Rectrons light below normal brilliancy, trouble may be due to an open filament in the ballast tube which has two parallel filaments.

4. If the plates of both Rectrons heat excessively, trouble may be caused by a shorted 4 or 7 Mfd. filter condenser in the power-amplifier unit, but if the plate of only one Rectron turns red hot, this Rectron is carrying part of the load of the other Rectron which is defective.

5. Should the plate of the UX-210 turn white hot look for an open resistor or shorted 2 Mfd. condenser in the power-amplifier unit.

6. In making the following tests of circuits, tubes and voltages, a Weston Radio Set Tester, Type 519 or equivalent is essential. It should be noted that when the tester is plugged into any of the catacomb sockets with the transfer switch in the radio position it is necessary to have a tube in each of the other six sockets and one in the tester in order to obtain correct readings. It might be well also to mention here that these tests were made using the low resistance type of 519 tester. In the cases of the plate circuit and grid circuit tests, sections 11, 12, 17 and 18, the readings obtained may be slightly higher than those given if the high resistance tester is used.

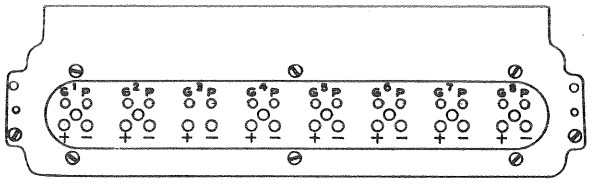


Fig. 2—Top of Catacomb

7. With the transfer switch in the record position, plug the tester in which a good Radiotron has been inserted, into No. 7 socket and check A, B and C voltages, noting the following:

8. "A" voltage less than 2.9 with battery setting at 10 will indicate:

a. Shorted 20 Mfd. condenser unit.

b. Poor contacts in transfer switch.

c. Loose connection at power-amplifier unit terminal board or radio panel terminal strip.

d. Open in section 8 of resistance strip. (See Fig. 3.)

e. Defective Rectron or ballast tube.

f. Resistance strip not properly tightened to catacomb.

g. Open filter choke in power-amplifier unit or broken connections to speaker field if moving coil type speaker or six inch cone are used.

h. Open 220 ohm filament resistor (located on frame of radio panel).

9. "A" voltage in excess of 3.3 with battery setting at 0 will indicate:*

a. Open in section 7 of resistance strip. (See Fig. 3.)

b. If high A voltage is accompanied by no B voltage reading the trouble may be caused by a shorted 2 Mfd. condenser in the power-amplifier unit, shorted unit in condenser bank or a shorted resistor in UP-591.

* Ample time should be allowed for the ballast tube to heat properly before concluding that filament voltage is excessive.

10. No "B" voltage will indicate:

a. Refer to section 9 (b).

b. Loose connection at power-amplifier unit terminal board or radio panel terminal strip.

c. Poor contacts in first stage jack.

d. Open primary of input transformer in the power-amplifier unit.

11. High "B" voltage (normal approximately 85) will indicate:

a. Open resistor in UP-591. Refer to section 23 and Fig. 5.

12. No "C" voltage (normal approximately 2.5) will indicate:*

a. Resistance strip not tightened to catacomb.

b. Open transformer secondary or shorted condenser in catacomb.

* Be sure tube in test box has no grid to filament short.

13. After making the above tests, check all Radiotrons in accordance with instructions accompanying tester, and replace any tubes found defective.

14. Insert plug connected to a pair of phones into first stage jack. If normal operation of Electrola or Radiola is noted at this point refer to section 20. Otherwise proceed as follows:

15. With transfer switch in radio position, and volume control at 10, check A, B and C voltages in all sockets, referring to Sec. 6 and to the following suggestions and tables.

16. If filament voltage is 0 in all sockets the transfer switch will probably be found to be making poor contact. Low filament voltage in one socket accompanied by abnormally high voltage in the others indicates a shorted or partially shorted section of the resistance strip. High filament voltage in one socket accompanied by insufficient voltage in the others indicates an open section in the resistance strip. If the defect is noted in No. 2 socket the trouble may be in the volume control, which should be carefully examined for possible short circuit or open circuit. It may be found that the arm does not travel to the end of the resistor when the pointer is advanced to 10 in which case full voltage cannot be obtained in No. 2 socket.

17. Plate Circuit Tests.

Socket No.	Approx. Value	Fault
1	24	Open transformer primary in catacomb.
2	66	Open transformer primary in catacomb.
3	70	Open in primary of R. F. coil or broken connection.
4	72	Open transformer primary in catacomb.
5	74	Open in Oscillator Coil or broken connection.
6	32	Open transformer primary in catacomb, shorted condenser in catacomb, or shorted condenser in condenser bank.
7		Refer to section 10.

18. Grid Circuit Tests.

The following is a list of faults indicated by 0 readings.

Socket No.	Approx Value	Fault (See note (a)
1	3	Open in secondary of R. F. coil.
2	3	Open transformer secondary in catacomb.
3	3	Open loop or broken connection.
4	3	Open transformer secondary in catacomb.
5	3	Open in grid coil of oscillator coil or broken connection.
6	0	See note (b).
7		Refer to section 12.

Note (a) A zero grid reading may also be caused by the resistance strip not being properly tightened to catacomb, or a shorted section in the A. C. strip.

Note (b) A slight reading will be obtained through the grid leak if the high resistance type of test box is used. A reversed deflection of the meter will indicate a shorted grid condenser.

19. Using the voltmeter of the tester in series with a battery of suitable voltage and a pair of test leads, test across each tuning condenser. If no reading is obtained in thus testing any one tuning circuit, examine condenser pig tails for possible broken connection and all connections between condenser and coil or between condenser and loop, if the loop circuit is the one at fault.

20. If, after making the foregoing tests, the instrument is still inoperative but normal operation is obtained in a pair of phones plugged into the first audio jack, the following tests should be made, with the same equipment as specified in section 19, making certain first that the power supply plug has been disconnected.

Test from plate of UX-210 socket to filament of either Rectron socket. No deflection on the meter will indicate an open primary in the output transformer or in the event that a moving coil speaker or a six inch cone is used—an open choke in the fuzz filter. Test from grid to filament of UX-210 socket. If no deflection is noted the trouble may be caused by an open secondary of the input transformer or a loose contact between the moving arm and the resistor of the hum control potentiometer.

Remove cable comb from the power-amplifier unit and test between the two terminals on the unit marked "output." No reading here will indicate an open secondary in the output transformer. Test between the two terminals on the cable comb which connect to the output terminals. If no reading is obtained look for open winding in loudspeaker unit or poor contacts in output jack.

21. Resistance Strip Values—Fig. 3, illustrates the two types of filament resistance strips mounted on the catacombs of the A. C. operated models. On recent production section No. 2 of this strip has been left open. This has been compensated for by lowering the resistance of the volume control rheostat which is shunted across section No. 2 of the resistance strip. When replacing volume control resistors in models Borgia II and Hyperion it is advisable to use the new type resistors. It is then necessary to cut the No. 2 winding in order to provide correct filament voltage regulation in socket No. 2.

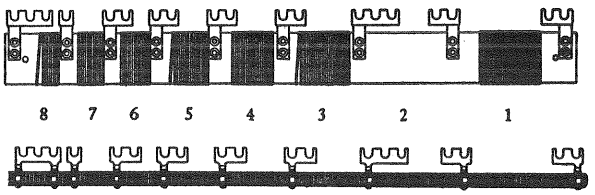


Fig. 3—A. C. Strip

	Borgia II and Hyperion		9-40, 9-25 and 9-55	
Sec.	Lower Limit	Upper Limit	Lower Limit	Upper Limit
1	185	195	260	282
2	360	420	Open (See note)	
3	159	167	230	243
4	151	159	191	203
5	126	134	173	191
6	117	123	143	163
7	112	118	137	154
8	45	55	45	55

Note:—In the early 9-40 model which has the 20,000 ohm volume control this section has a resistance of 240 to 260 ohms.

22. Resistance Strip Test.

If a resistance bridge is not available, the values of the various sections of the resistance strip can be checked by the voltmeter—ammeter method, a circuit diagram of which is shown in Fig. 4. The resistance may be calculated using Ohm's law by dividing the voltage by the current reading. If the current is taken in milliamperes it is necessary to multiply the result by 1,000 to get the resistance value in ohms.

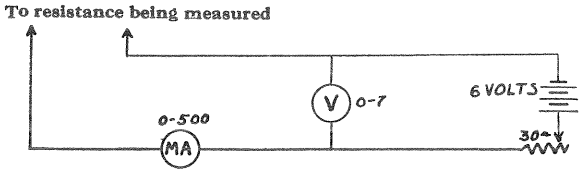


Fig. 4—Wiring Diagram for Resistance Measurement

23. UP-591 Test.

The same method of resistance measurement shown in Fig. 4 can also be used to check the resistance of the UP-591 resistor except that a 45 volt battery and suitable voltmeter will be required. The resistance of the UP-591 resistor should be approximately 1,500 ohms.

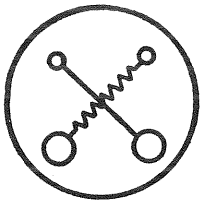


Fig. 5—Bottom View of UP-591 Base Showing Internal Connections

24. Excessive Hum.

In models 9-40, 9-25 and 9-55 provisions have been made to minimize the hum audible from the loud speaker by means of a potentiometer, the knob of which is located on the top of the power-amplifier unit. This knob should be turned in either direction until the hum is at a minimum.

25. Loose Rheostat or Volume Control Contacts.

The resistance cartridges in the Battery Setting and Volume Control rheostats will sometimes become dirty or oxidized, which will cause a grating noise in the loud speaker whenever these controls are turned. The resistance wire on the cartridges should be brightened with a fine grade of sand paper to provide better contact with the contact arm.

In some cases it may be necessary to loosen the set screw holding the contact arm to the shaft and to adjust the arm to obtain greater pressure on the resistor, after which the set screw may be retightened.

26. Acoustic Howl.

This is caused by the microphonic action of the UX-199 Radiotrons in the catacomb. The second detector (No. 6) and the first audio (No. 7) tubes, are the most critical to this condition and should be replaced or interchanged with the other Radiotrons having less microphonic tendencies.

27. Blasting.

Blasting is usually caused by an improperly adjusted speaker or a low emission Radiotron UX-210.

28. Distortion.

A low emission UX-210 may cause distortion. This Radiotron can sometimes be reactivated by operating the power-amplifier unit for a period of ten minutes with the two Rectrons removed

Distortion may originate in a leaky 2 Mfd. condenser which is connected between the primary of the power transformer and the +A —B terminal in the power-amplifier unit. This condenser may be checked by temporarily disconnecting it and operating the Radiola noting if distortion ceases. Under no condition should this condenser be left out permanently.

29. Fluttering.

Fluttering is a loud hum having a 60 cycle base and occurs at the resonant point when manipulating the dial drums. An audio choke which has been added to the circuit to prevent this may have become open or disconnected. To test this choke for continuity it is necessary to first disconnect it from the circuit.

This choke is located inside the radio panel in the Hyperion, beneath the radio panel in the Borgia II either in the power-amplifier unit or in the back of the cabinet in model 9-40.

30. If volume drops after Radiola has been in operation for several minutes.

This condition is usually caused by a defective Radiotron UV-876 or UV-886. This Radiotron after having been in use for considerable time, may develop a tendency to increase its resistance when heated sufficiently to cause a drop in signal strength of the Radiola.

Diminishing of volume of this nature, which will occur on any signals received, should not be confused with "fading" of certain distant stations, which is due to atmospheric conditions, and transmission characteristics.

31. Lack of Sensitivity.

If the Radiola seems to have lost its ability for distant reception, the cause of which could not be ascribed to unfavorable weather conditions, etc., the loop compensating condenser may be out of adjustment. A description of the necessary apparatus and the procedure for checking and correcting this adjustment will be found in Service Bulletin No 18.

32. Oscillation.

It is important not to confuse with oscillation —"Heterodyning," which occurs only when tuning in certain stations and which sometimes can be eliminated by tuning to the "lower peak" with the right hand dial drum. Oscillation can sometimes be eliminated by interchanging the Radiotron in No. 3 socket with the other Radiotrons in the catacomb. In some cases it may be found that the R. F. neutralizing condenser is disconnected, defective or out of adjustment. In models 9-2 and 15-1 this is a fixed condenser mounted on the terminal strip of the catacomb, and if defective must be replaced. In the later models, however, it is a small condenser mounted beneath the panel and its capacity may be varied by means of an insulated screw driver. In few cases will it be necessary to make any adjustment of this condenser.

In some cases a type of oscillation commonly called "parasitics" will be present, and cannot be eliminated by adjusting the neutralizing condenser or by replacing the catacomb. It can usually be eliminated, however, by placing a small cartridge type neutralizing condenser or other small capacity across catacomb terminals 7 and 10 (see Fig. 6).

Oscillation may also be due to the neutralizing condenser in the catacomb being out of adjustment, in which case it will be necessary to replace the catacomb.