

SERVICE NOTES

for

RCA Victor Radiola R-11

RCA Victor Console, R-11 is a nine tube Super-Heterodyne Radio Receiver providing excellent performance in all the features incorporated in modern radio broadcast receivers.

Automatic volume control, push-pull Pentode output stage, tone control, calibrated kilocycle dial, acoustically correct cabinets and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne are some of the features of this receiver. Referring to Figure 1, the schematic circuit diagram, and tracing a signal through the various stages, we find the following action taking place.

The first tube is the tuned R. F. stage. This is the new Super Control Screen Grid Radiotron, RCA-235. The outstanding feature of this Radiotron is that due to its grid potential plate current curve having a constant rate of curvature, cross modulation, modulation distortion, and hum modulation effects are eliminated from the receiver. Also it is very adaptable to automatic volume control action due to its characteristics that preclude the necessity of a local distant switch. The control grid bias for this Radiotron is varied by means of the automatic volume control tube.

The output of this circuit is coupled inductively to the grid coil of the first detector. At this point the oscillator should be considered as its output is also coupled inductively to the grid coil of the first detector. This is a tuned grid circuit oscillator using a Radiotron UY-227, and having a closely coupled plate coil that gives sufficient feed-back to provide stable operation. The grid circuit is so designed that by means of a correct combination of capacity and inductance a constant frequency difference between the oscillator and the tuned R. F. circuits throughout the tuning range of the receiver is obtained.

The next circuit to examine is the first detector. The circuit is tuned by means of one of the gang condensers to the frequency of the incoming signal. Radiotron UY-224 is used in this stage. In the grid circuit there is present the incoming signal and the oscillator signal, the latter being at a 175 K. C. difference from the former. The first detector is biased so as to operate as a plate rectification detector and its purpose is to extract the difference or beat frequency, produced by combining the signal and oscillator frequencies. The beat frequency—175 K. C.—appears in the plate circuit of the first detector which is accurately tuned to 175 K. C.

The next stage is that of the I. F. amplifier. A single stage is used, requiring two I. F. transformers, consisting of four tuned circuits. The plate circuit of the first detector, the grid and plate circuit of the I. F. amplifier and the grid circuit of the second detector are all tuned to 175 K. C. Radiotron RCA-235 is used in this stage and its control grid voltage is also varied by means of the automatic volume control tube.

At this point it is well to consider the action of the automatic volume control tube as it controls the R. F. and I. F. amplifiers of the receiver. The automatic volume control functions in the usual manner in that the signal voltage is applied to its grid and the voltage drop across a resistor in the plate circuit is the grid voltage applied to the I. F. and R. F. stages. As the value of the plate current is a direct result of the signal voltage applied to the grid, a greater plate current gives a greater voltage drop across the resistor in its plate circuit and therefore a higher bias on the I. F. and R. F. stage. This results in less sensitivity and vice versa. The signal output of the I. F. stage is always maintained at a constant value.

The volume control should now be considered as its position in the circuit has a large bearing on the quiet and smooth action of this receiver.

In previous automatic volume control receivers, the volume control was placed in the grid circuit of the automatic volume control tube, its action being to vary the control grid voltage of this tube. When operating sets of this character, the receiver jumped to full sensitivity when not tuned to a signal and if in a noisy location, this noise was very objectionable.

In this instrument, however, the volume control is not in the automatic volume control tube circuit, but in the grid circuit of the second detector. By means of it the signal voltage applied to the second detector is controlled and under no conditions can noise or other signals exceed the level for which it has been set. Electrically, the primary and secondary of the second I. F. transformer are shielded from each other so that there is no transference of energy except by means of a small pickup coil. The volume control is a potentiometer shunted across this coil which determines the amount of pickup that will be used. As a further means of controlling a strong signal, a second section is provided which places up to 10,000 ohms (R-21) in series with the tuned circuit of second detector grid. This effectively reduces even the most powerful signals received.

The second detector is a high-plate voltage, grid-biased type, using Radiotron UY-227, which gives sufficient output to drive two Radiotrons RCA-247 connected in push-pull without an intermediate audio stage. The purpose of the second detector is to extract the audio frequency component of the R. F. signal which represents the voice or musical modulations produced in the studio of the broadcasting station. The audio component is extracted and used to drive the power tubes while the R. F. current is by-passed and not further used.

A grid filter consisting of a 1 megohm resistor (R-13) in the second detector circuit and a 0.5 megohm resistor (R-4) in the R.F. circuit helps to reduce any possible hum in these stages. The power A. F. stage consists

of two Radiotrons RCA-247 connected in push-pull. Transformer coupling is used between the detector and the grids of the Radiotrons RCA-247 as well as from the plates to the cone coil of the reproducer unit.

A tone control, consisting of a 0.008 mfd. condenser in series with a 200,000 ohm variable resistor connected across the two grids of Radiotrons RCA-247 is incorporated in this stage. The tone control functions to reduce the high frequency output as the resistance is reduced. At the extreme low position, the condenser and secondary of the A. F. transformer resonate at a low frequency and thereby further accentuate the bass response. The two 0.0004 mfd. condensers, connected in series with their mid-point grounded are connected across the secondary of the input transformer. The purpose of these condensers is to prevent audio oscillations and provide a high frequency audio cut-off.

A 0.005 mfd. condenser connected in series with a 10,000 ohm resistor is placed across the primary of the output transformer. This functions to reduce the third harmonic distortion, an inherent characteristic of the Pentode output tube. The direct plate and grid voltages are supplied from high voltage alternating current which is rectified by means of Radiotron UX-280. The filter is of the tapped reactor type which gives an output of well filtered D. C. The bias voltage for the Radiotrons RCA-247 is obtained by using a portion of the drop across the reproducer field. One 190,000 ohm and one 40,000 ohm resistors act as the voltage dividing resistors.

SERVICE DATA

Information pertaining to general service data for this type receiver may be obtained from the Service Notes already issued on the RCA Victor Radiola Superette. Figure 1 shows the schematic diagram, Figure 2 the proper connections for attaching a magnetic pickup to the R-11 and Figure 3 the wiring diagram. The voltage readings and replacement parts are shown on page 3.

R. F. OSCILLATOR AND I. F. ADJUSTMENTS

A reference to the RCA Victor Radiola Superette Service Notes will give the details for making correct R. F., I. F. and Oscillator adjustments. However, due to the use of an automatic volume control tube, its action will defeat the use of an output meter. To overcome this, a "dummy" Radiotron UY-227 (one that has one heater prong removed but is otherwise O.K.) should be substituted for the tube in the automatic volume control socket. *Do not make any adjustments with this tube removed from the socket.* While apparently everything functions in the normal manner, the lack of tube capacity in the circuits will cause an incorrect alignment to be made.

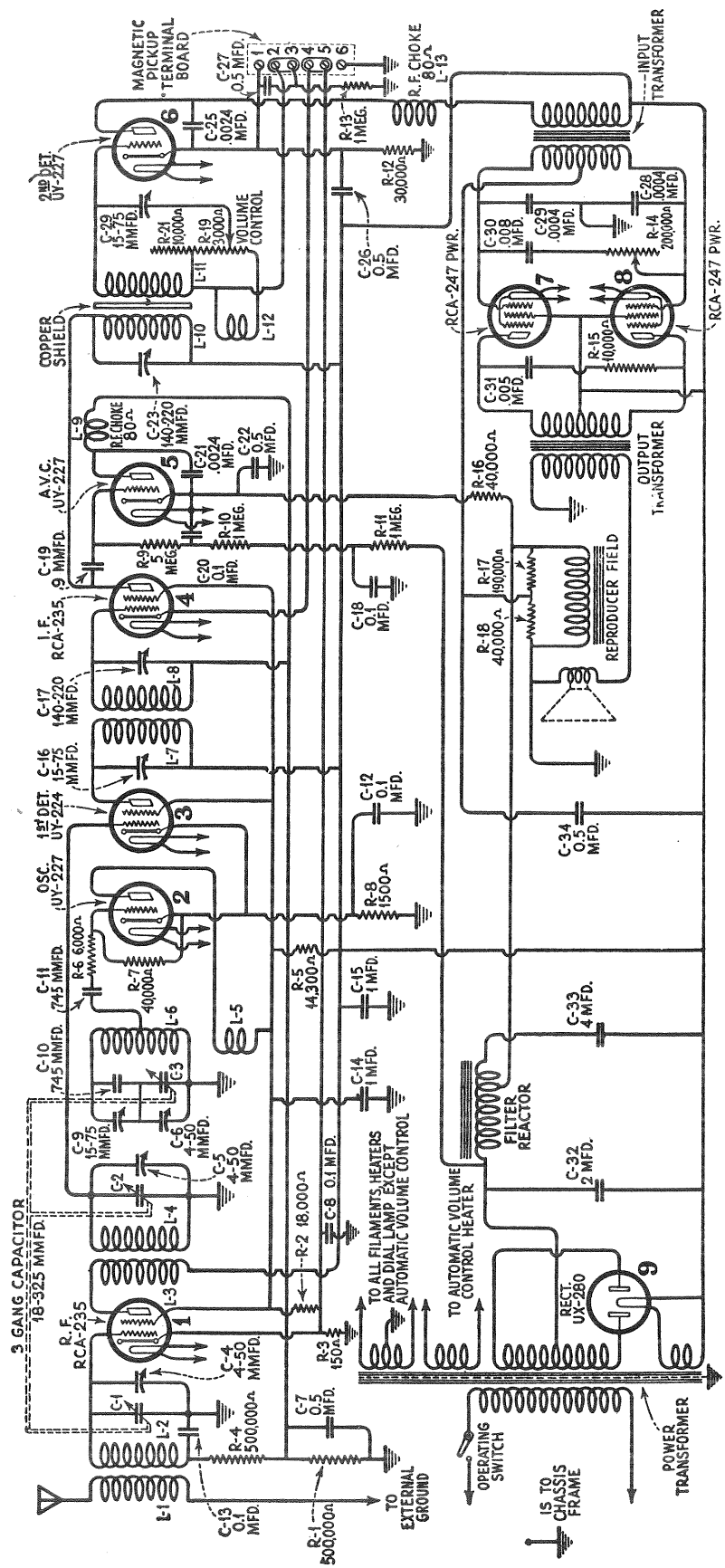


Figure 1—Schematic Circuit Diagram of Model R-11

RADIOTRON SOCKET VOLTAGES

110 VOLT A. C. LINE

(Volume Control Setting Does Not Affect Voltages)

Radiotron No.	Cathode to Heater Volts D. C.	Cathode or Filament to Control Grid Volts, D. C.	Cathode or Filament to Screen Grid Volts, D. C.	Cathode or Filament to Plate Volts, D. C.	Plate Current M. A.	Screen Current M. A.	Heater or Filament Volts, A. C.
1	2	*0.1	75	205	5.0	0.5	2.2
2	8	0	—	60	5.0	—	2.2
3	7	7.0	70	200	0.5	0.1	2.2
4	2	*0.1	75	205	5.0	0.5	2.2
5	0	0	—	25	0	—	2.2
6	20	*8.0	—	180	0.5	—	2.2
7	—	10	210	205	25	—	2.2
8	—	10	210	205	25	—	2.2

* Not true reading due to resistance in circuit.

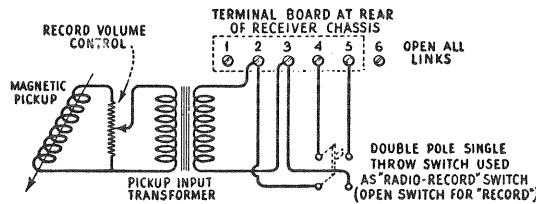


Figure 2—Magnetic Pickup Connections

REPLACEMENT PARTS

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
2563	Resistor—6,000 ohms—Carbon type—Package of 5..	\$3.00	3097	Scale—Dial drum scale with set screws—Pkg. of 2..	\$0.50
2730	Resistor—18,000 ohms—Carbon type—Package of 5	2.00	3098	Capacitor—0.008 mfd.50
2734	Capacitor—745 mmfd.—Package of 5.....	2.20	3099	Capacitor—0.005 mfd.75
2746	Socket—Dial lamp socket.....	.50	7054	Cord—Power cord.....	1.00
2747	Contact cap—Package of 5.....	.50	7062	Capacitor—Adjustable oscillator trimmer capacitor..	1.00
2749	Capacitor—2400 mmfd.....	1.50	7241	Capacitor—3 gang tuning capacitor with mounting screws and washers.....	8.00
2875	Knobs—Package of 5.....	1.50	7266	Transformer—1st intermediate transformer.....	3.00
2882	Socket—UY Radiotron socket—Complete with insulating shield—8 used.....	.50	7267	Transformer—2d intermediate transformer.....	3.00
2968	Socket—UX Radiotron socket—Complete with insulating shield—1 used.....	.50	7268	Coil—Detector or A.V.C. R.F. choke coil—Complete with mounting rivet.....	.60
2999	Shaft—Dial drum drive shaft.....	.50	7269	Capacitor pack—In metal container—60 cycle.....	7.25
3029	Indicator—Tuning dial indicator—Complete with bracket.....	.50	7270	Reactor—Filter reactor.....	4.00
3046	Resistor—190,000 ohms—Carbon type—Package of 5	2.50	7271	Transformer—Interstage transformer.....	4.25
3047	Resistor—1500 ohms—Carbon type—Package of 5..	2.50	7272	Transformer—Power transformer—105-125 volt, 50-60 cycles.....	12.00
3048	Resistor—500,000 ohms—Carbon type—Package of 5	2.50	7273	Capacitor pack—By-pass capacitor pack—25-40 cy.	10.00
3049	Resistor—150 ohms—Carbon type—Package of 5..	2.50	7274	Transformer—Power transformer—105-125 volts, 25-40 cycles.....	15.00
3050	Resistor—14,000 ohms—Carbon type—Package of 1	.60	7275	Transformer—Power transformer—220 volts, 50-60 cycles.....	10.00
3051	Resistor—5 megohm—Carbon type—Package of 5..	2.00			
3053	Capacitor—9 mmfd.—Package of 2.....	.50		LOUDSPEAKER ASSEMBLY	
3054	Escutcheon—Station selector escutcheon—With 4 mounting screws.....	.60	7257	Coil—Cone support with retaining ring, magnet and field coil.....	6.00
3055	Cushion—Chassis support cushion—Package of 4....	.50	7258	Transformer—Output transformer.....	1.70
3056	Shield—Radiotron shield—6 used—Package of 2....	.50	8559	Ring—Cone retaining ring.....	.80
3076	Resistor—1 megohm—Carbon type—Package of 5....	2.50	8601	Cone—Cone with voice coil—Package of 5.....	15.00
3077	Resistor—30,000 ohms—Carbon type—Package of 5	2.50		CABINET ASSEMBLY	
3078	Resistor—10,000 ohms—Carbon type—Package of 5	2.50	8691	Panel—Control panel.....	8.50
3079	Resistor—40,000 ohms—Carbon type—Package of 5	2.50	8692	Grille cloth and baffle board.....	.90
3085	Capacitor—400 mmfd.....	.60	8693	Leg—Front—Right or left.....	1.25
3089	Terminal board—Magnetic pickup terminal board....	.50	8694	Leg—Back—Right hand.....	1.00
3090	Board—A. V. C. and 2nd detector R. F. choke mounting board—Less choke coils.....	.50	8695	Leg—Back—Left hand.....	1.00
3091	Board—Resistor board—Less resistor and capacitors	1.00	8696	Stretcher.....	2.50
3092	Volume control—Complete with mounting nut.....	1.50	8697	Foot.....	.75
3093	Tone control—Complete with mounting nut.....	1.90	8698	Top.....	5.50
3094	Shield—Radiotron shield—1 used—Package of 2....	.50	8699	Ornament—Control panel ornament.....	2.25
3095	Coil—R.F. coil—Complete with mounting bracket....	1.90	9358	Cabinet—Complete less all equipment.....	62.50
3096	Coil—1st detector and oscillator coil—Complete with mounting bracket.....	3.55			

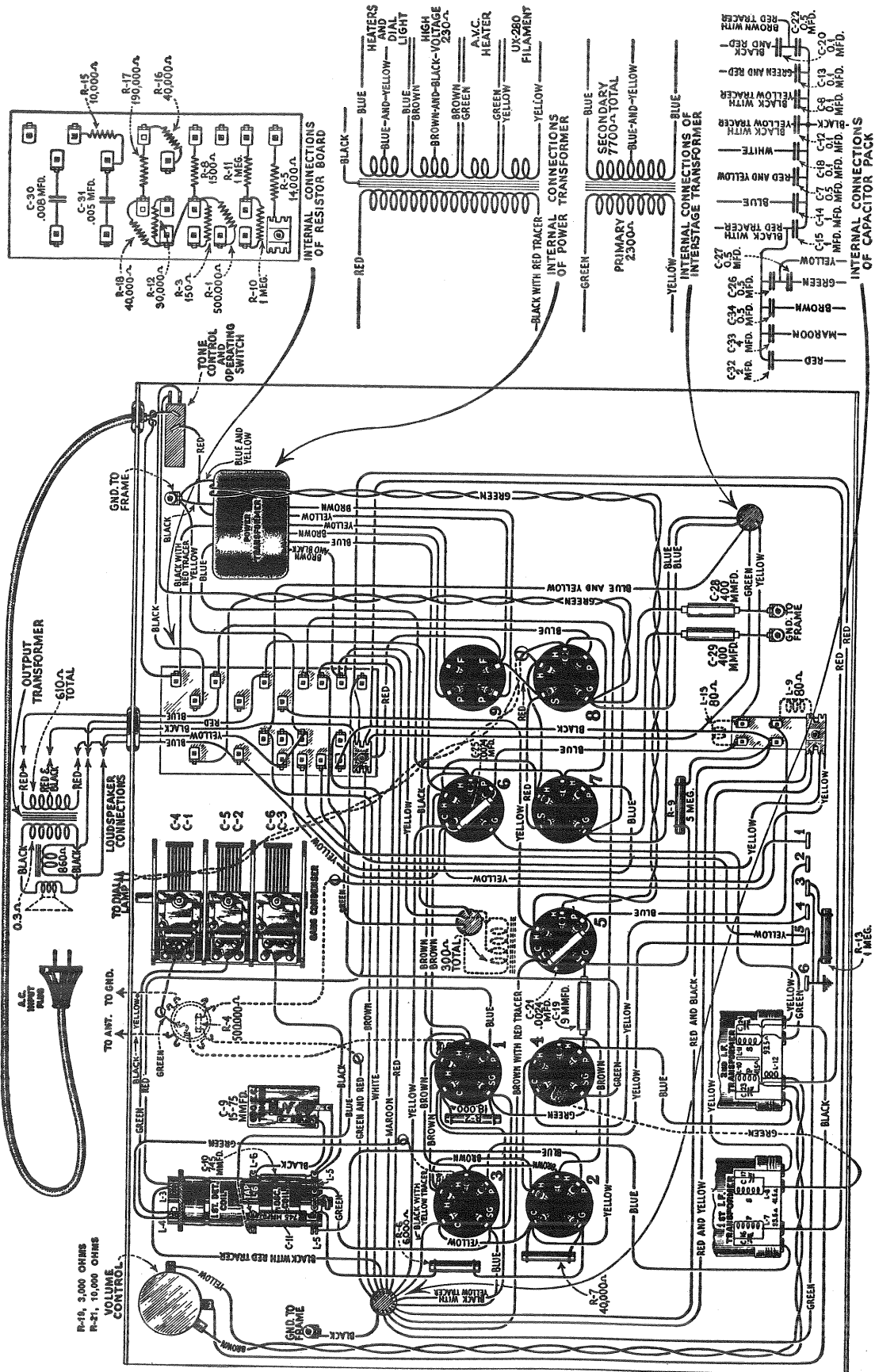


Figure 3—Wiring Diagram of Model R-11

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