

RCA VICTOR MODELS 226 AND 128

Six-Tube, Three-Band, A. C. Superheterodyne Receivers

SERVICE NOTES

ELECTRICAL SPECIFICATIONS

Voltage and Frequency Ratings.....	$\left\{ \begin{array}{l} 105-125 \text{ Volts, } 50-60 \text{ Cycles} \\ 105-125 \text{ Volts, } 25-60 \text{ Cycles} \\ 100-130/195-250 \text{ Volts, } 50-60 \text{ Cycles} \end{array} \right.$
Power Consumption.....	Approximately 80 Watts
Number and Type of Radiotrons... 2 RCA-6D6, 1 RCA-6A7, 1 RCA-6B7, 1 RCA-42, 1 RCA-80—Total, 6	
Tuning Frequency Range Limits.....	$\left\{ \begin{array}{l} \text{Band "A"—} 540 \text{ K. C.—} 1,720 \text{ K. C.} \\ \text{Band "B"—} 1,720 \text{ K. C.—} 5,400 \text{ K. C.} \\ \text{Band "C"—} 5,400 \text{ K. C.—} 18,000 \text{ K. C.} \end{array} \right.$
Alignment Frequencies.....	460 K. C., 600 K. C., 1,720 K. C., and 18,000 K. C.
Maximum Undistorted Output.....	1.75 Watts
Maximum Output.....	3.5 Watts

PHYSICAL SPECIFICATIONS

	<i>Model 226</i>	<i>Model 128</i>
Height.....	39 Inches.....	20 $\frac{1}{4}$ Inches
Width.....	24 Inches.....	16 $\frac{3}{4}$ Inches
Depth.....	12 Inches.....	11 $\frac{1}{8}$ Inches

These receivers, both of which employ the same chassis, are manufactured from a design that includes such requirements as "all-wave" reception, high sensitivity, good selectivity and pleasing tone quality. The tuning ranges listed above cover the standard broadcasting band, and extend into the shorter wave regions for reception of foreign and trans-oceanic broadcast signals.

Uniform tonal quality is realized from the output

of these instruments. With the efficiently designed reproducer units, and the amplification system supplying them, more than adequate volume may be obtained; the undistorted limit of output being 1.75 watts.

Special operating features used on this chassis include a "full vision-airplane dial," a dual-ratio vernier drive, a high frequency tone control, automatic volume control, and a visual indicator for the three-position band switch.

DESCRIPTION OF ELECTRICAL CIRCUIT

The general circuit arrangement consists of an R. F. stage, a combined oscillator and first detector, an I. F. stage, a combined second detector—audio amplifier—AVC Stage, and a single Pentode output stage. An RCA-80 rectifier, together with a suitable filtering system, provides plate and grid voltages for all tubes and field excitation for the loudspeaker. Figure 3 shows the schematic circuit diagram, Figure 4 the chassis wiring, and Figures 7 to 10 the loudspeaker wiring.

The signal enters the receiver through a shielded antenna lead and is applied to the grid of the R. F. tube through the antenna coupling transformer. The secondary of this transformer is tuned to the signal frequency by means of one unit of the gang-capacitor. The output of this stage is transformer coupled to the grid circuit of the first detector, which is also tuned to the signal frequency by a unit of the gang-capacitor.

Combined with the signal in the first detector is the local oscillator, which is always at a 460 K. C. frequency difference (higher) from the signal frequency. A separate coil system and the third unit of the gang-capacitor are used in this circuit.

In conjunction with these three tuned circuits, it is well to point out that three different groups of tuned circuits are used, one for each tuning band. A three-position selector switch is provided for selecting the band in which the desired signal is located. In addition to selecting the desired coil system, additional groups of contacts are provided for short-circuiting the preceding lower frequency R. F. and detector coils and the two preceding oscillator coils. This is to prevent "dead" spots due to the absorption effects caused by the coils, the natural period of which, with tuning capacitor disconnected, fall in the next higher frequency band.

The output of the first detector, which is the I. F. signal (460 K. C.), is fed directly through two tuned circuits to the grid of the I. F. amplifier stage. The I. F. stage, which utilizes Radiotron RCA-6D6, has two transformers, which consist of four tuned circuits, all of which are tuned to 460 K. C.

The output of the I. F. amplifier is then applied to the diode electrodes of the RCA-6B7, which cause detection. The direct current component of the rectified signal produces a voltage drop across resistor R-12. The full voltage drop constitutes the automatic bias voltage for the R. F., while a tap is provided for the first detector and I. F. voltage. These automatic bias voltages for the R. F. first detector and I. F. give the automatic volume control action of the receiver. The volume control arm selects the amount of audio voltage that is applied to the grid of the RCA-6B7 and thereby regulates the audio output of the entire receiver.

The output of the RCA-6B7 is introduced to the RCA-42 output tube through the resistance-capacitance coupling network. By inspection of the schematic, it may be seen that band switch contacts are arranged to affect the frequency response of this coupling system by changing the total value of the capacitance. The purpose of such change with band position is to make possible the desired fidelity on the short-wave bands, and to maintain the utmost fidelity on the regular broadcast band.

In the power output stage, the RCA-42 is operated as a Pentode amplifier. It provides high audio gain and good quality. The usual step-down plate transformer is used for matching the tube to the cone coil of the loudspeaker.

The tone control consists of a variable resistor and fixed capacitor connected in series across the primary of the output transformer. At the minimum resistance position of the variable resistor, maximum attenuation of the high audio frequencies is obtained.

Plate and grid voltages for all tubes are supplied from the output of the rectifier-filter system. An RCA-80 is used as a rectifier and a suitable network of capacitors and resistors gives the necessary filtering and voltages. The loudspeaker field is used as a filter reactor.

(1) LINE-UP PROCEDURE

Properly aligned, this receiver performs outstandingly; improperly aligned, there may be a tendency towards low sensitivity and distorted quality of reproduction. Inasmuch as the line-up procedure is more or less involved, it is important that these instructions be carefully followed.

Equipment

To align this receiver, proper test equipment must be used. Such consists of a modulated R. F. oscillator having proper frequency range, an output indicator, an alignment tool and a tuning wand. These parts, shown on page 2, have been developed by the manufacturer of this receiver for use by service men to duplicate the original factory adjustments.

Checking with Tuning Wand

Before making any R. F., oscillator or first detector adjustments, the accuracy of the existing adjustments may be checked with a tuning wand (Stock No. 6679). This wand consists of a bakelite rod having a brass cylinder at one end and a special finely divided iron insert at the other end. Inserting the cylinder into the center of a coil lowers its inductance, while inserting the iron end increases its inductance. From this, it is seen that unless the trimmer for a particular coil is properly aligned, the wand may increase the output of the receiver. A perfect adjustment is evidenced by a lowering of output when either end of the wand is inserted into a coil.

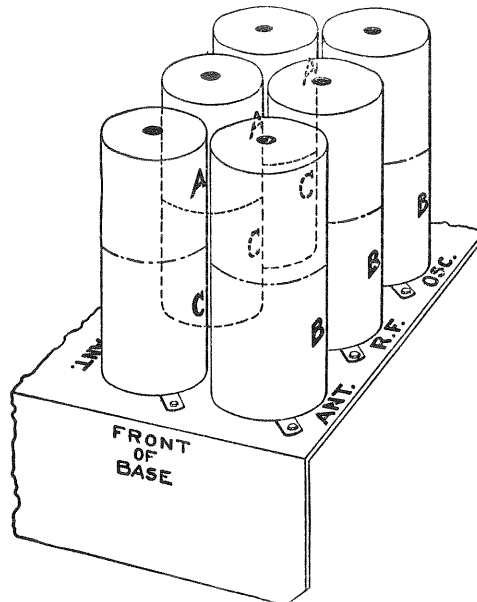


Figure 1—Location of Coils in Shields

The shield over each R. F. coil assembly has a hole at its top for entrance of the tuning wand. The location of the various coils inside of their shields is shown in Figure 1. An example of the proper manner of using the tuning wand would be to assume the external oscillator were set at 1,720, the signal tuned in, and the output indicator connected across the voice coil of the loudspeaker. Then the tuning wand should be inserted, first one end and then the other end, into the top of the three transformers at the left of the R. F. assembly, facing the front of the chassis. A perfect adjustment of the trimmer would be evidenced by a reduction in output when each end of the wand is inserted into each of the three transformers. If one end—for example, the iron end—when inserted in one coil caused an increase in output, then that circuit is high. An increase in the trimmer capacitance would be the proper remedy.

(2) I. F. TUNING CAPACITOR ADJUSTMENTS

Although this receiver has one I. F. stage, there are two transformers, each having two adjustable capacitors requiring adjustment. The transformers are all peaked, being tuned to 460 K. C.

A detailed procedure for making this adjustment follows:

- (a) Connect the output of an external oscillator operating at 460 K. C. between the first detector grid and ground. Connect the output indicator across the voice coil of the loudspeaker,
- (b) Place the receiver in operation and adjust the station selector until a point is reached (B and A) where no signals are heard and turn the volume control to its maximum position. Reduce the oscillator output until a slight indication is obtained in the receiver output indicator.
- (c) Refer to Figure 2. Adjust the trimmers of the I. F. transformers until a maximum output is obtained. Go over the adjustments a second time.

This completes the I. F. adjustments. It is good practice to follow the I. F. adjustments with the R. F. and oscillator adjustments due to interlocking which always occurs between the two.

(3) R. F. OSCILLATOR AND FIRST DETECTOR ADJUSTMENTS

Four R. F., oscillator and first detector adjustments are required in band "A." Three are required in bands "B" and "C."

To properly align the various bands, each must be aligned individually in the order given. This is "A," "B" and "C." The preliminary set-up requires that the external oscillator be connected between the antenna and ground terminals of the receiver and the

output indicator be connected across the voice coil of the loudspeaker. The volume control must be at its maximum position and the output of the oscillator must be at the minimum value possible to get an output indication under these conditions. In the high frequency bands, it may be necessary to disconnect the oscillator from the receiver and place it at a distance in order to get a sufficiently low input to the receiver.

The dial pointer must be properly set before starting actual adjustments. This is done by turning the variable capacitor until it is at its maximum capacity position. One end of the pointer should point exactly at the horizontal line at the lowest frequency end of band "A," while the other end should point to within $\frac{1}{4}$ inch of the horizontal line at the highest frequency end of band "A."

Figure 2 shows the location of the trimmers for each band. Care must be exercised to only adjust the trimmers in the band under test.

Band "A"

- (a) Set the band switch at "A."
- (b) The oscillator series capacitor, located on the rear apron of the chassis, should be set at about the center of its range.
- (c) Tune the external oscillator to 1,720 K. C., set the pointer at 1,720 K. C. and adjust the oscillator, detector and R. F. trimmers for maximum output.
- (d) Shift the external oscillator frequency to 600 K. C. Tune in the 600 K. C. signal, irrespective of scale calibration, and adjust the series trimmers, located on rear apron of chassis, for

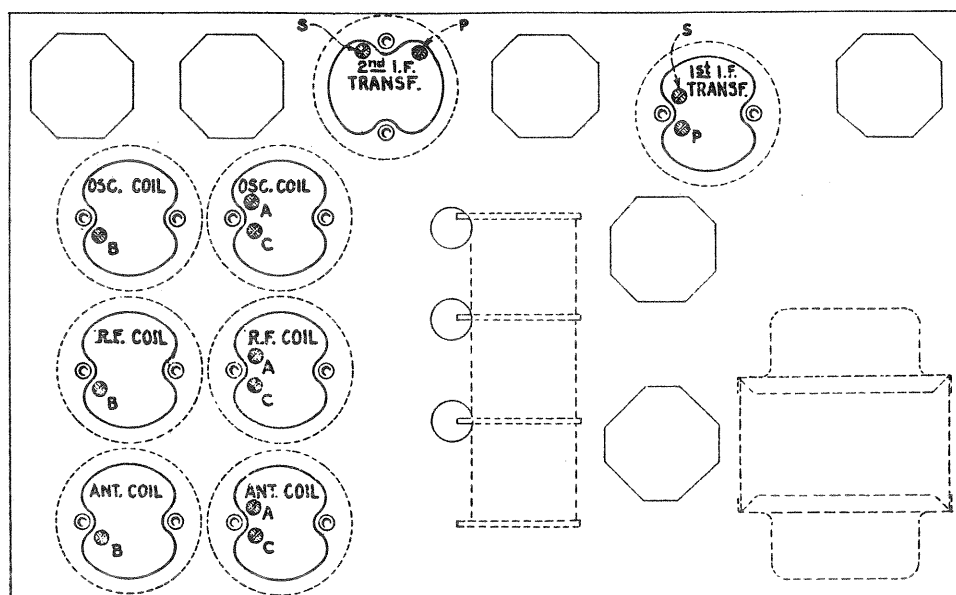


Figure 2—Location of Line-up Capacitors

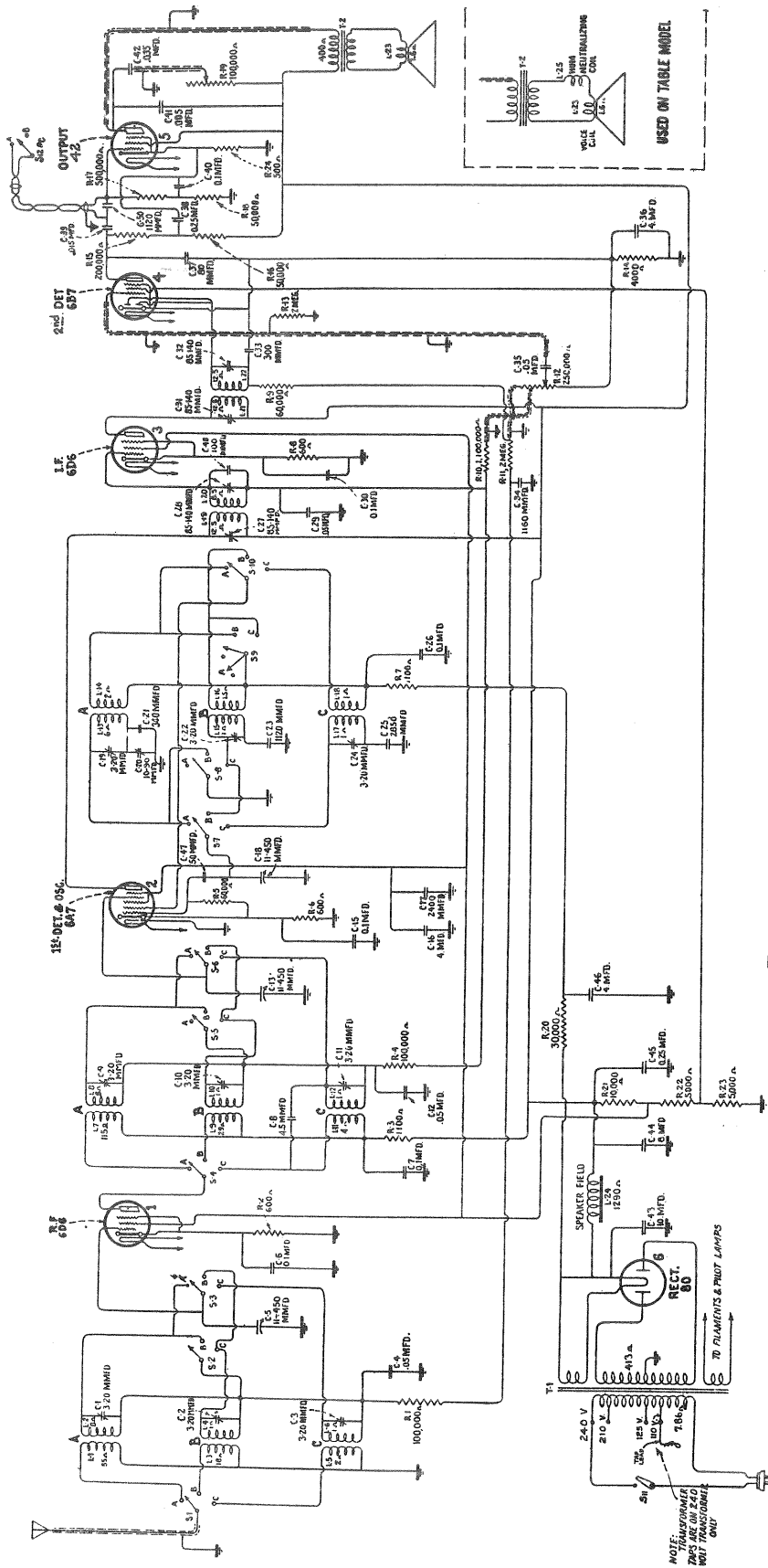
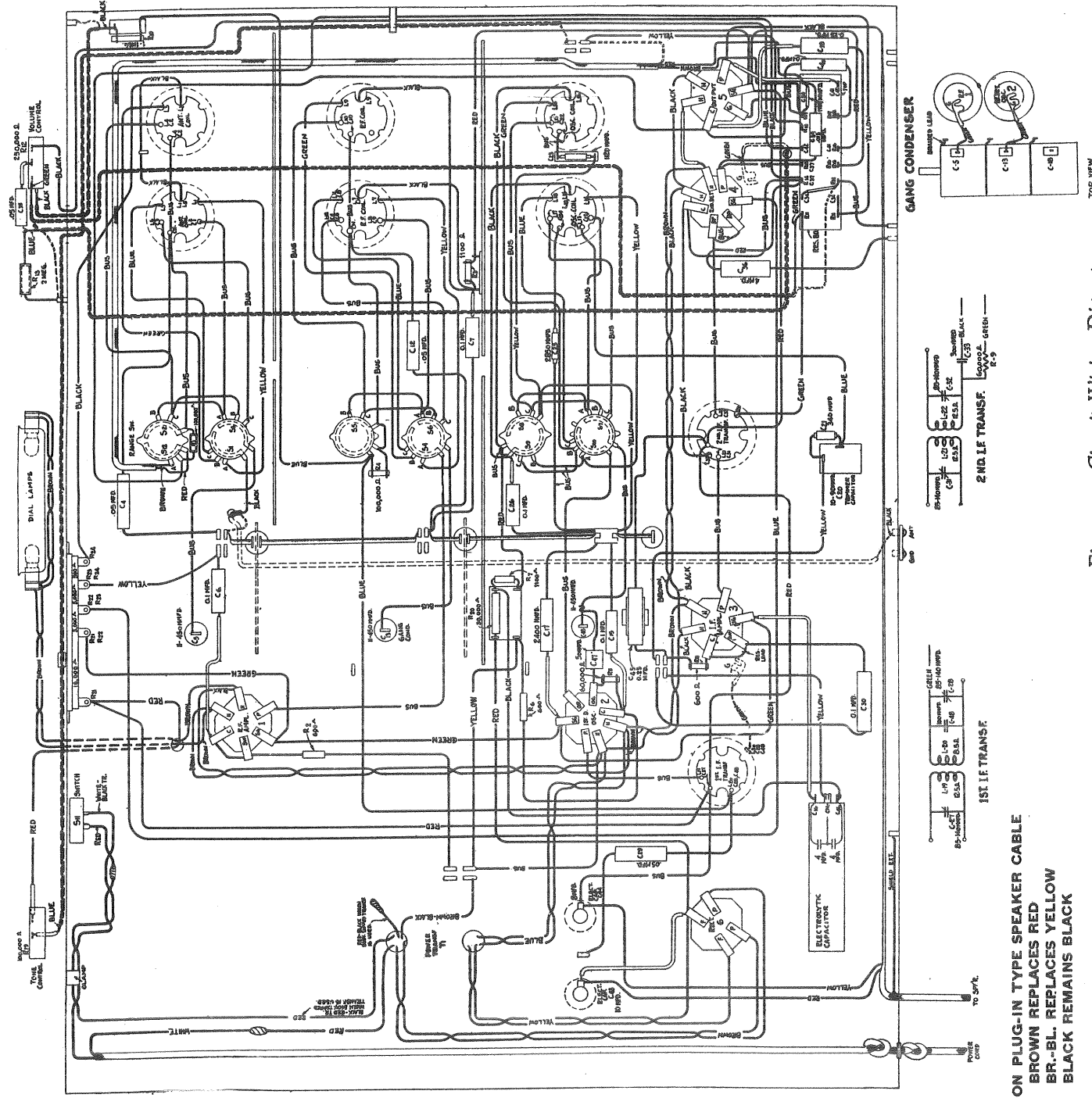
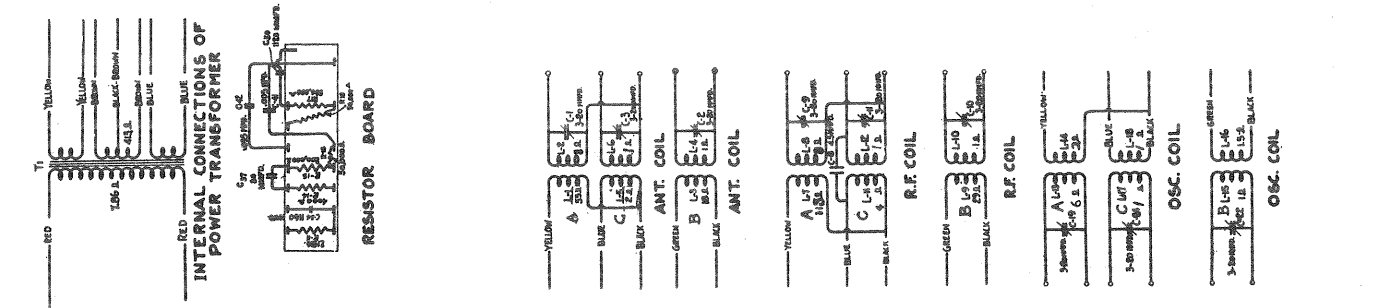
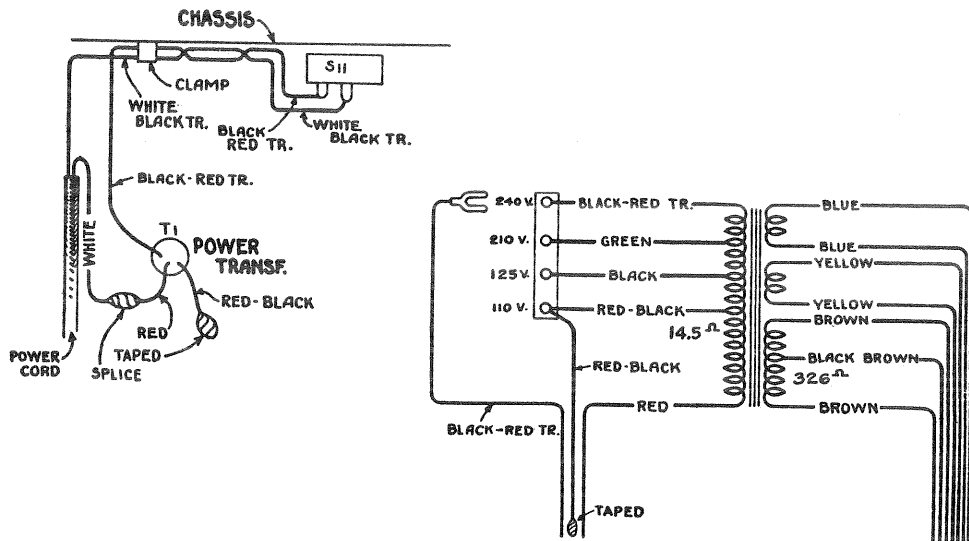


Figure 3—Schematic Circuit Diagram



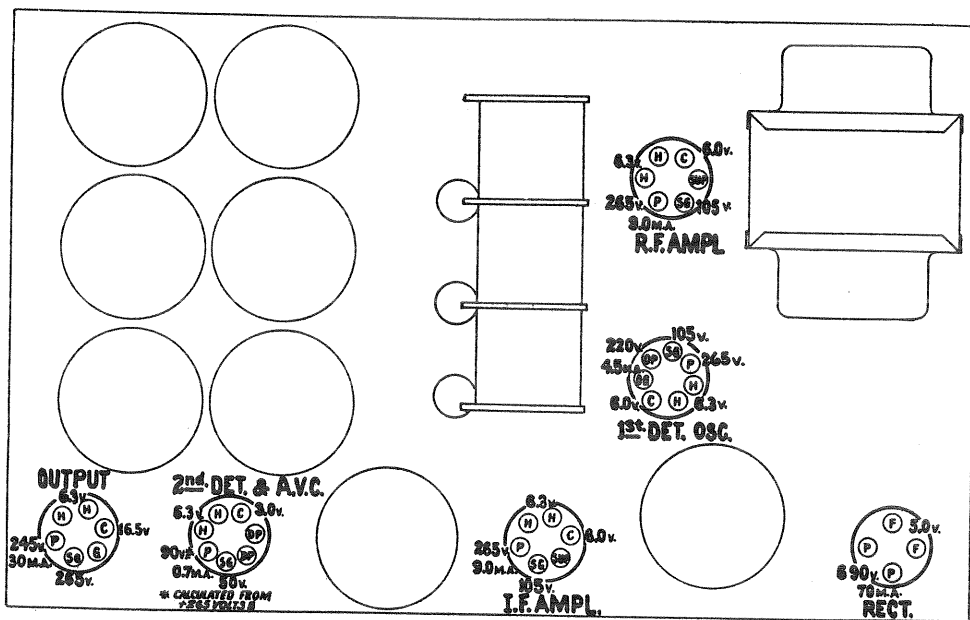
ON PLUG-IN TYPE SPEAKER CABLE
 BROWN REPLACES RED
 BR.-BL. REPLACES YELLOW
 BLACK REMAINS BLACK

Figure 4—Circuit Wiring Diagram



INTERNAL CONNECTIONS OF POWER TRANSF.

Figure 5—Universal Transformer Connections (50-60 Cycles)



ALL D. C. VOLTAGES ARE TO GROUND

Figure 6—Tube Socket Voltages

maximum output, at the same time rocking the variable tuning capacitor. Then readjust at 1,720 K. C. as described in (c).

Band "B"

- Set the band switch at "B."
- The detector and antenna trimmers should first be tightened to approximately $\frac{3}{4}$ maximum capacity (turned $\frac{3}{4}$ inch).
- Tune the external oscillator to 5,160 K. C., set the pointer at 5,160 K. C. Adjust the oscillator trimmer for maximum output. The trimmer should be set at the first peak obtained when increasing the trimmer capacitor from minimum to maximum.
- Check for the image signal, which will be received at approximately 4,240 K. C. on the dial, if the trimmer is set properly in accordance with (c). It may be necessary to increase the external oscillator output for this check.
- Reduce the capacity of the detector trimmer, while rocking the tuning capacitor, until the signal disappears. *The first detector circuit is then aligned with the oscillator circuit and the RCA-6A7 tube is blocked.* Then increase the capacity of the detector trimmer, while rocking

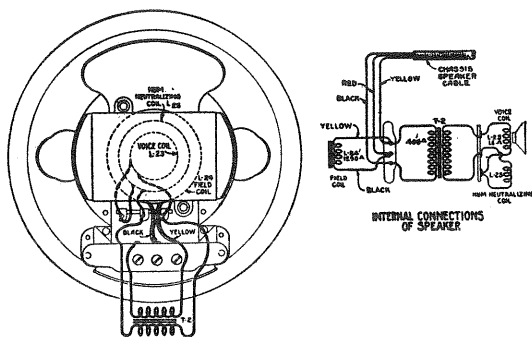


Figure 7—Table Loudspeaker Wiring (without cable plug)

the tuning capacitor, until the signal is peaked for maximum output.

- The antenna trimmer should now be peaked for maximum output. It is not necessary to

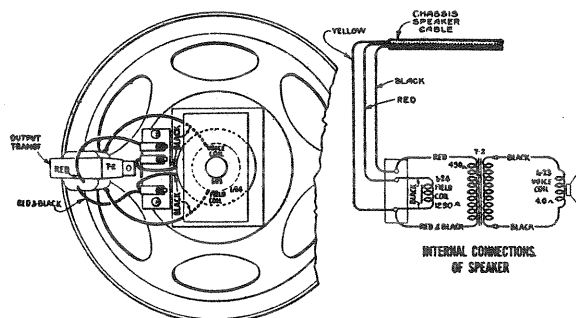


Figure 8—Console Loudspeaker Wiring (without cable plug)

rock the main tuning capacitor while making this adjustment.

Band "C"

- Set the band switch at "C."
- The detector and antenna trimmers should first be tightened to approximately $\frac{3}{4}$ maximum capacity (turned $\frac{3}{4}$ in.)
- Tune the external oscillator to 18,000 K. C., set the pointer at 18 M. Adjust the oscillator trimmer for maximum output. The trimmer should be set at the first peak obtained when increasing the trimmer capacitor from minimum to maximum.
- Check for the image signal, which will be received at approximately 17,080 on the dial, if (c) has been properly done. It may be necessary to increase the external oscillator output for this check.

RADIOTRON SOCKET VOLTAGES

115-Volt A. C. Line—No Signal—Volume Control—Maximum

RADIOTRON NUMBER	CATHODE TO GROUND, VOLTS, D. C.	SCREEN GRID TO GROUND, VOLTS, D. C.	PLATE TO GROUND, VOLTS, D. C.	PLATE CURRENT, M. A.	HEATER VOLTS, A. C.
RCA-6D6—R. F.	6.0	105	265	9.0	6.3
RCA-6A7	Det.	105	265	3.5	6.3
	Osc.	—	220	4.5	
RCA-6D6—I. F.	6.0	105	265	9.0	6.3
RCA-6B7—2nd Detector	3.0	50	90*	0.7	6.3
RCA-42—Power	16.5	265	245	30.0	6.3
RCA-80—Rectifier	—	—	690 (RMS)	70.0	5.0

*Voltage calculated from 265 V. + B.

- (e) Reduce the capacity of the detector trimmer, while rocking the tuning capacitor, until the signal disappears. *The first detector circuit is then aligned with the oscillator circuit and the RCA-6A7 tube is blocked.* Then increase the capacity of the detector trimmer, while rocking the tuning capacitor, until the signal is peaked for maximum output.
- (f) The antenna trimmer should now be peaked for maximum output. It is not necessary to rock the main tuning capacitor while making this adjustment.

(4) VOLTAGE READINGS

The voltages specified are those at the various tube sockets while the receiver is in operating condition. No allowance has been made for currents drawn by the meter, and if low-resistance meters are used, such allowances must be made.

(5) POWER TRANSFORMER CONNECTIONS

The 220-volt power transformer furnished with some instruments includes taps for operating on 110-volt lines. Figure 5 shows the schematic circuit of the transformer and the proper voltage to be applied to the various taps. The taps are located on the power transformer assembly and are accessible without removing the chassis from the cabinet.

(6) VARIATIONS OF MODEL 128

This Service Note does not apply in complete detail to the original six-tube chassis employed in Model 128 during 1934 production. The modifications found on the present chassis do not affect the general service procedure, but rather account for certain minor changes in wiring layout. Notice should be taken that the power output stage uses an RCA-42 instead of the original RCA-41.

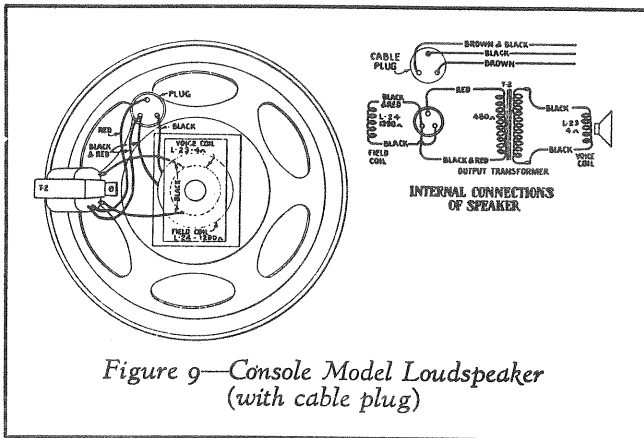


Figure 9—Console Model Loudspeaker (with cable plug)

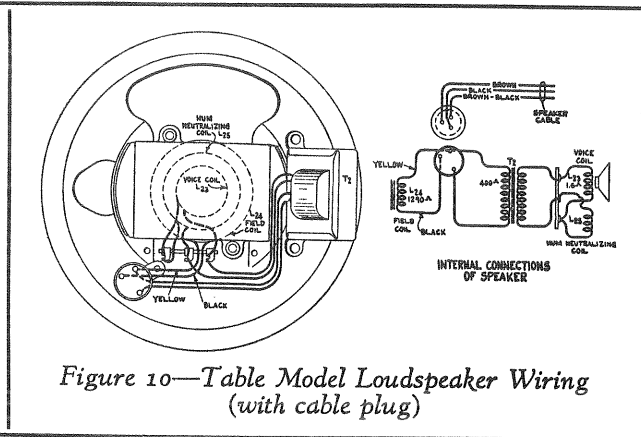


Figure 10—Table Model Loudspeaker Wiring (with cable plug)

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
RECEIVER ASSEMBLIES					
4427	Bracket—Volume control or tone control mounting bracket	\$0.18	4428	Capacitor—8 mfd. (C44)	\$1.05
4244	Cap—Contact cap—Package of 5 . . . . .	.20	7790	Capacitor—10 mfd. (C43)	1.05
3861	Capacitor—Adjustable trimmer capacitor (C20) . . . . .	.78	4692	Capacitor pack—Comprising one 0.035 mfd. and one 0.005 mfd. capacitors (C41, C42) . . . . .	.30
5094	Capacitor—50 mmfd. (C47) . . . . .	.20	7589	Capacitor pack—Comprising two 4. mfd. capacitors (C16, C46)	1.64
4662	Capacitor—80 mmfd. (C37) . . . . .	.24	4358	Clamp—Electrolytic capacitor mounting clamp . . . . .	.15
4811	Capacitor—340 mmfd. (C21) . . . . .	.25	4808	Coil—Antenna coil "Band B" (L3, L4, C2)	1.92
4412	Capacitor—1120 mmfd. (C23) . . . . .	.25	7803	Coil—Antenna coil "Band A-C" (L1, L2, L5, L6, C1, C3)	1.82
4515	Capacitor—1160 mmfd. (C34) . . . . .	.22	4815	Coil—Detector coil "Band B" (L9, L10, C10)	1.80
4634	Capacitor—1120 mmfd. (C50) . . . . .	.35	7805	Coil—Detector coil "Band A-C" (L7, L8, L11, L12, C8, C9, C11)	2.15
4523	Capacitor—2400 mmfd. (C17) . . . . .	.26	7807	Coil—Oscillator coil "Band A-C" (L13, L14, L17, L18, C19, C24)	1.62
4524	Capacitor—2850 mmfd. (C25) . . . . .	.35	4807	Coil—Oscillator coil "Band B" (L15, L16, C22)	1.85
4792	Capacitor—.015 mfd. (C39) . . . . .	.22	7801	Condenser—3-gang variable tuning condenser (C5, C13, C18)	4.42
4518	Capacitor—.05 mfd. (C35) . . . . .	.52	4340	Lamp—Dial lamp—Package of 5 . . . . .	.60
4836	Capacitor—.05 mfd. (C4, C12, C29) . . . . .	.30	3218	Resistor—600 ohms—Carbon type— $\frac{1}{4}$ watt (R2, R6, R8)—Package of 5	1.00
4841	Capacitor—.1 mfd. (C6, C15, C30, C40) . . . . .	.22			
4885	Capacitor—.1 mfd. (C7, C26) . . . . .	.28			
3597	Capacitor—.25 mfd. (C38, C45) . . . . .	.40			
4525	Capacitor—4.0 mfd. (C36) . . . . .	.70			

REPLACEMENT PARTS (Continued)

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
4834	Resistor—1100 ohms—Carbon type— $\frac{1}{4}$ watt (R3, R7)—Package of 5.....	\$1.00		REPRODUCER ASSEMBLY TABLE MODEL	
3997	Resistor—4000 ohms—Carbon type— $\frac{1}{4}$ watt (R14)—Package of 5.....	1.00	4526	Cable—3-conductor—Reproducer cable with spade terminals.....	\$0.32
3114	Resistor—50,000 ohms—Carbon type— $\frac{1}{4}$ watt (R16, R18)—Package of 5.....	1.00	5085	Cable—3-conductor reproducer cable with female connector.....	.45
3602	Resistor—60,000 ohms—Carbon type— $\frac{1}{4}$ watt (R5)—Package of 5.....	1.00	9579	Coil—Field coil only.....	2.10
3118	Resistor—100,000 ohms—Carbon type— $\frac{1}{4}$ watt (R1, R4)—Package of 5.....	1.00	9533	Cone—Reproducer cone mounted and centered on housing.....	3.50
3116	Resistor—200,000 ohms—Carbon type— $\frac{1}{4}$ watt (R15)—Package of 5.....	1.00	5118	Connector—3-contact male connector for reproducer.....	.25
6186	Resistor—500,000 ohms—Carbon type— $\frac{1}{4}$ watt (R17)—Package of 5.....	1.00	5119	Connector—3-contact female connector for reproducer cable.....	.25
4783	Resistor—1,100,000 ohms—Carbon type— $\frac{1}{4}$ watt (R10)—Package of 5.....	1.00	7818	Reproducer complete—For use with chassis having reproducer cable with spade terminals.....	6.58
6242	Resistor—2 megohms—Carbon type— $\frac{1}{4}$ watt (R11, R13)—Package of 5.....	1.00	9578	Reproducer complete—For use with chassis having cable with connector.....	6.58
2240	Resistor—30,000 ohms—Carbon type—1 watt (R20).....	.22	4818	Transformer—Output transformer.....	2.15
4721	Resistor—Tapped resistor, one 10,000 ohms, two 5000 ohms, and one 500 ohms section (R21, R22, R23, R24).....	.88		REPRODUCER ASSEMBLY CONSOLE MODEL	
4521	Shield—I. F. transformer shield.....	.42		(For use with chassis having reproducer cable with spade terminals)	
4742	Shield—Antenna R. F. or oscillator coil shield.....	.40	4473	Board—Terminal board assembly.....	.26
3942	Shield—First detector or output Radiotron shield.....	.18	4526	Cable—3-conductor with spade terminals....	.32
7487	Shield—I. F. amplifier Radiotron shield.....	.25	9460	Coil—Field coil, magnet and cone support (L24)	6.00
4705	Shield—R. F. amplifier Radiotron shield.....	.30	8935	Cone—Reproducer cone (L23)—Package of 5.	5.25
3782	Shield—Second detector Radiotron shield....	.26	9527	Reproducer—Complete.....	8.00
3529	Socket—Dial lamp socket.....	.32	4472	Transformer—Output transformer (T2).....	1.40
4784	Socket—4-contact Radiotron socket.....	.15		REPRODUCER ASSEMBLY CONSOLE MODEL	
4786	Socket—6-contact output Radiotron socket....	.15		(For use with chassis having reproducer cable with connector)	
4785	Socket—6-contact Radiotron socket.....	.15	5085	Cable—3-conductor reproducer cable complete with female connector.....	.45
4787	Socket—7-contact Radiotron socket.....	.15	5118	Connector—3-contact male connector for reproducer.....	.25
4379	Strip—Antenna terminal engraved "ANT-GND".....	.20	5119	Connector—3-contact female connector for reproducer cable.....	.25
4684	Switch—Operating switch (S11).....	.45	9590	Coil—Field coil, magnet and cone support (L24).....	4.20
4728	Switch—Range switch (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S12).....	4.32	8935	Cone—Reproducer cone (L23)—Package of 5.	5.25
4810	Tone control (R19).....	1.30	9589	Reproducer complete.....	8.20
4431	Transformer—First intermediate frequency transformer (L19, L20, C27, C28, C48)....	2.28	4892	Transformer—Output transformer (T2).....	1.30
4433	Transformer—Second intermediate frequency transformer (L21, L22, C31, C32, C33, R9)....	2.15		MISCELLANEOUS ASSEMBLY	
9511	Transformer—Power transformer—105-125 volts, 50-60 cycles (T1).....	4.78	4677	Bezel—Station selector dial (escutcheon) bezel	.56
9512	Transformer—Power transformer—105-125 volts, 25-40 cycles.....	6.58	4661	Dial—Station selector dial.....	.62
9513	Transformer—Power transformer—105-250 volts—40-60 cycles.....	4.85	6614	Glass—Station selector dial glass.....	.30
4809	Volume control (R12).....	1.45	4520	Indicator—Station selector indicator pointer..	.18
	DRIVE ASSEMBLIES		4449	Knob—Station selector, volume control, tone control, range switch or operating switch knob—Package of 5.....	.60
4362	Arm—Band Indicator operating arm.....	.28	4678	Ring—Dial glass retaining ring —Package of 5.....	.34
10194	Ball—Steel ball for condenser drive assembly—Package of 20.....	.25	4446	Screw—Chassis mounting screw assembly comprising 4 spacers, 4 screws, 4 lockwashers, 4 washers, 8 cushions—For table model.	.28
4422	Clutch—Clutch drive assembly for variable condenser drive.....	1.00	4945	Screw—Chassis mounting screw assembly—Comprising 4 spacers, 4 screws, 4 lockwashers, 4 washers and 8 cushions—For console model.....	.50
4510	Drive—Tuning condenser drive assembly....	2.42	4613	Screw—Number 8-32-7/16 headless set screw for knobs—Package of 10.....	.25
4704	Indicator—Band indicator (celluloid).....	.12			
3943	Screen—Dial light screen (celluloid)—Package of 2.....	.18			
3993	Screw—Number 6-32-5/32 square head set screws for band indicator operating arm—Package of 10.....	.25			
4669	Screw—Number 8-32-5/32 set screw for variable condenser drive assembly—Package of 10.....	.25			
4377	Spring—Band indicator and arm tension spring—Package of 5.....	.25			
4378	Stud—Band indicator operating arm stud—Package of 5.....	.25			