

Instructions for RCA Victor 220 and 222

Six-Tube Double-Range Superheterodyne Receivers

INSTALLATION

Location—The instrument should be placed convenient to the antenna and ground connections and to an electrical outlet.

Radiotrons—The instrument is equipped and tested at the factory with RCA Radiotrons and is shipped with the tubes in the sockets. Before making the required external connections, however, it will be advisable to examine the tube installation as one or more of the tubes, shields or dome terminal clips may have been jarred loose in shipment. Refer to the tube location diagram printed on the license label inside the cabinet, and **make certain**:

- (1) That all tubes are in the proper sockets and pressed down firmly.
- (2) That all shields are rigidly in place over the Radiotrons shown by double circles on the diagram.
- (3) That the short flexible leads shown on the diagram are attached to the top grid contacts of the proper Radiotrons as indicated, and that the spring contact clips are pressed down firmly.

NOTE—For the 2B7 Radiotron only, the grid lead must be enclosed by the cylindrical tube shield. A slot is provided at the bottom of this shield for entrance of the lead.

Antenna and Ground—An outdoor antenna having a length of from 25 to 75 feet, including the lead-in and ground wiring, is recommended. In many cases, however, an indoor

antenna of short or medium length will be found satisfactory in buildings of non-metallic construction. The antenna should be well insulated from all objects and should be run neither close nor parallel to electric circuits inside or outside the building.

A good ground connection is essential for best performance. The ground lead should be as short as possible and preferably attached to a cold-water pipe. The pipe should be scraped clean and an approved ground clamp should be used to insure a tight and permanent connection.

Two flexible leads are provided at the rear of the receiver for connection to the antenna and ground. Connect the *black* lead to the antenna wire or lead-in and the *yellow* lead to the ground wire. Both joints should be soldered and wrapped with insulating tape.

Power Supply—Connect the power cord to an electrical outlet supplying alternating current at the proper voltage and frequency (cycles), as specified on the license label.

OPERATION

Controls—The instrument has four operating controls located on the front panel of the cabinet. Viewing the front of the cabinet, these controls from left to right are:

- (1) **Power Switch and Tone Control**—Power switch operates at counter-clockwise end of control range. A slight clockwise rotation actuates the switch, causing illumination of the dial—indicative of normal operation. Continued clockwise rotation increases the treble response gradually.

- (2) **Station Selector**—Equipped with clock-type illuminated full-vision dial, calibrated to facilitate location and identification of stations (add one cipher to scale numerals to obtain frequency in kilocycles).

- (3) **Frequency Range Switch**—Converts receiver for operation within either of two frequency ranges, as follows:

Counter-Clockwise Position—Standard broadcast band (540 to 1500 kilocycles)—Frequencies within this band are indicated upon the upper half of the dial.

Clockwise Position—Police Range (1600 to 3500 kilocycles)—Frequencies within this range are indicated upon the lower half of the dial and include the following major services:

- (a) **Police Calls**—At dial settings near "170" for stations transmitting at 1712 kilocycles and near "250" for stations operating in the 2450 kilocycle band.
- (b) **Amateur Radio "Phone"**—At dial settings between "180" and "200" (assigned band 1800–2000 kilocycles).
- (c) **Aviation Communications (Phone)**—At dial settings between "250" and "350" (2500–3500 kilocycles).

- (4) **Volume Control**—Sound level (volume) increases with rotation of this control in a clockwise direction.

Procedure—To operate the receiver, proceed as follows:

1. Set the Frequency Range Switch for the desired frequency band—see preceding paragraph (3).

2. Apply power by turning the Tone Control knob clockwise from the "off" position; continue rotation of this control

to the opposite extremity for *full-range* reproduction. Set the Volume Control near the middle of its range.

3. Allow approximately one-half minute for the tubes to heat, then turn the Station Selector slowly over the range of the dial until a desirable station program is heard. If no station is heard, advance the Volume Control further in a clockwise direction and again rotate the Station Selector.

NOTE—The majority of stations in the 1600–3500 kilocycle band do not offer continuous programs. Police calls are usually intermittent at regular or irregular intervals. Local or strong stations in the 540–1500 kilocycle broadcast band may be audible (sometimes at more than one point on the dial) when the Frequency Range Switch is set for 1600–3500 kilocycles.

4. After receiving a signal, turn the Volume Control counter-clockwise until the volume is reduced to a low level. Now readjust the Station Selector accurately to the position mid-way between the points where the quality becomes poor or the signal disappears. ***This setting minimizes the proportion of background noise and provides the fine quality of reproduction possible with this instrument.***

5. Adjust the Volume Control to the desired volume level.

NOTE—The automatic volume control built into this instrument maintains the volume level substantially constant irrespective of normal fluctuations of signal strength (fading). Also, other stations with good signal strength will be received at approximately the same volume without readjustment of the Volume Control.

6. Turn the Tone Control counter-clockwise if reduced treble response is preferred, or if interference (static) is excessive.

7. When through operating, switch off the power by turning the Tone Control knob to the extreme counter-clockwise position.

Radiotrons—Improved results may sometimes be obtained by interchanging the RCA-58 Radiotrons in their sockets. The power should be switched off before removing any Radiotron from its socket. Spare Radiotrons should be kept on hand.

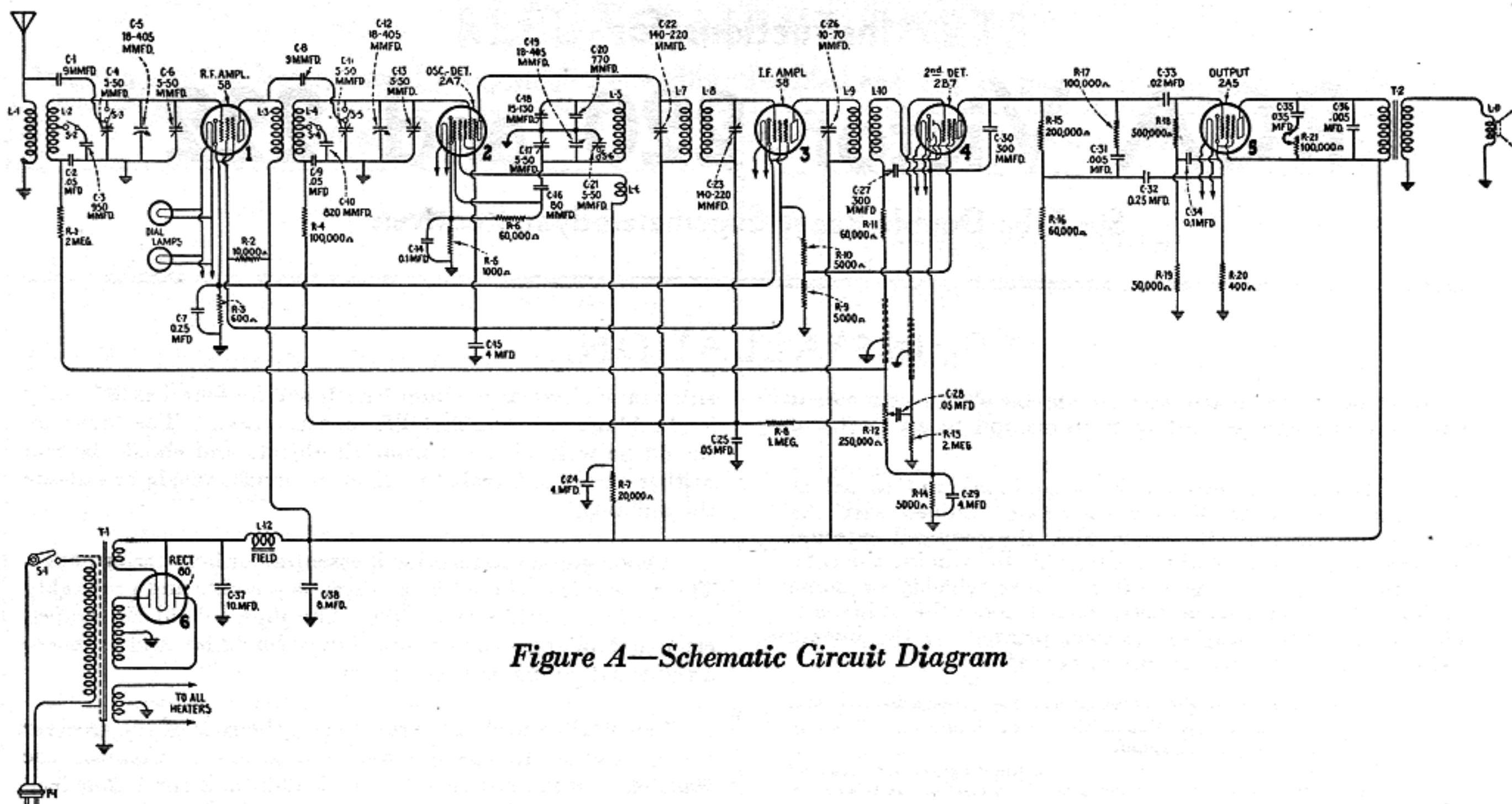


Figure A—Schematic Circuit Diagram

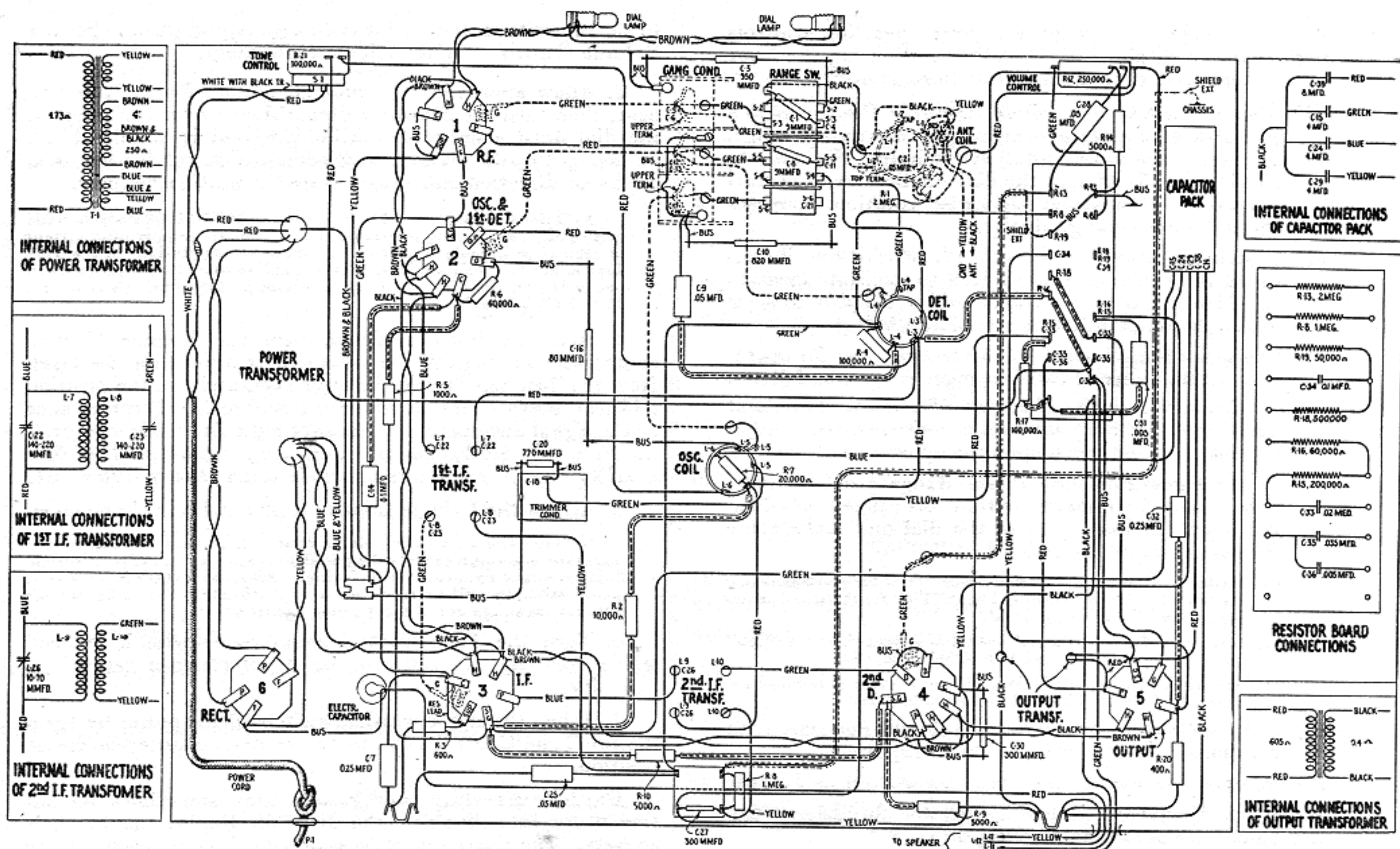


Figure B—Wiring Diagram

SERVICE DATA

Electrical Specifications

Voltage Rating..... 105-125 Volts
 Frequency Rating..... 25-60 and 50-60 Cycles
 Power Consumption... 60 Cycle 75 Watts, 25 Cycle 80 Watts
 Number and Types of Radiotrons..... 2 RCA-58,
 1 RCA-2A7, 1 RCA-2B7, 1 RCA-2A5, 1 RCA-80—Total 6
 Undistorted Output..... 1.75 Watts
 Frequency Range..... 540 K. C. to 1500 K. C.
 and 1600 K. C. to 3500 K. C.

This receiver is a six tube Superheterodyne incorporating features such as electro-dynamic loudspeaker, automatic volume control, single heater type Pentode output tube, con-

Service work in conjunction with this receiver will be similar to that of other Superheterodyne receivers incorporating a similar type automatic volume control.

Line-up Adjustments

I. F. Tuning Adjustments—Two transformers comprising three tuned circuits (the secondary of the second transformer is untuned) are used in the intermediate amplifier. These are tuned to 175 K. C. and the adjustment screws are accessible from beneath the chassis as shown in Figure C. Proceed as follows:

- Procure a modulated oscillator giving a signal at 175 K. C., a non-metallic screw driver such as stock No. 7065 and an output meter.
- Short-circuit the antenna and ground leads and tune the receiver so that no signal is heard. Set the volume control at maximum and connect a ground to the chassis.
- Connect the oscillator output between the first detector control grid and chassis ground. Connect the output meter across the voice coil of the loudspeaker and adjust the oscillator output so that with the receiver volume control at maximum, a slight deflection is obtained in the output meter.
- Adjust the primary of the second, and the secondary and primary of the first I. F. transformers until a maximum deflection is obtained. Keep the oscillator output at a low value so that only a slight deflection is obtained on the output meter at all times. Go over these adjustments a second time, as there is a slight interlocking of adjustments. This completes the I. F. adjustments.

R. F. and Oscillator Adjustments—The three gang capacitor screws are located on the main tuning capacitor, accessible at the top of the chassis. The high frequency capacitor screws are located on the Range Switch. Proceed as follows:

- Procure a modulated oscillator giving a signal at 1400 and 2440 K. C., a non-metallic screw driver such as Stock No. 7065 and an output meter.
- Connect the output of the oscillator to the antenna and ground lead of the receiver. Check the dial at the extreme maximum position of the tuning capacitor. The indicator pointer should be set on the white inner radial line located at approximately 530 K. C. Then set the dial at 140, the oscillator at 1400 K. C. and connect the output meter across the cone coil. Adjust the oscillator output so that a slight deflection is obtained when the receiver volume control is at maximum.
- After making the 1400 K. C. adjustment, shift the oscillator to 600 K. C. and tune in the signal. Adjust the 600 K. C. trimmer, accessible from the top of the chassis, for maximum output while rocking the gang-capacitor back and forth. Then again check the adjustment described in (b).
- With the Range Switch at the counter-clockwise position, adjust the three tuning condenser line-up capacitors until maximum deflection is obtained in the output meter. Then shift the oscillator to 2440 K. C., the Range Switch to the clockwise position and the dial to 244. The three line-up capacitors located on the Range Switch and accessible from the bottom of the chassis should then be adjusted for maximum output.

When making both the I. F. and R. F. adjustments, the important point to remember is that the receiver volume control must be at its maximum position and the minimum input signal necessary from the oscillator must be used.

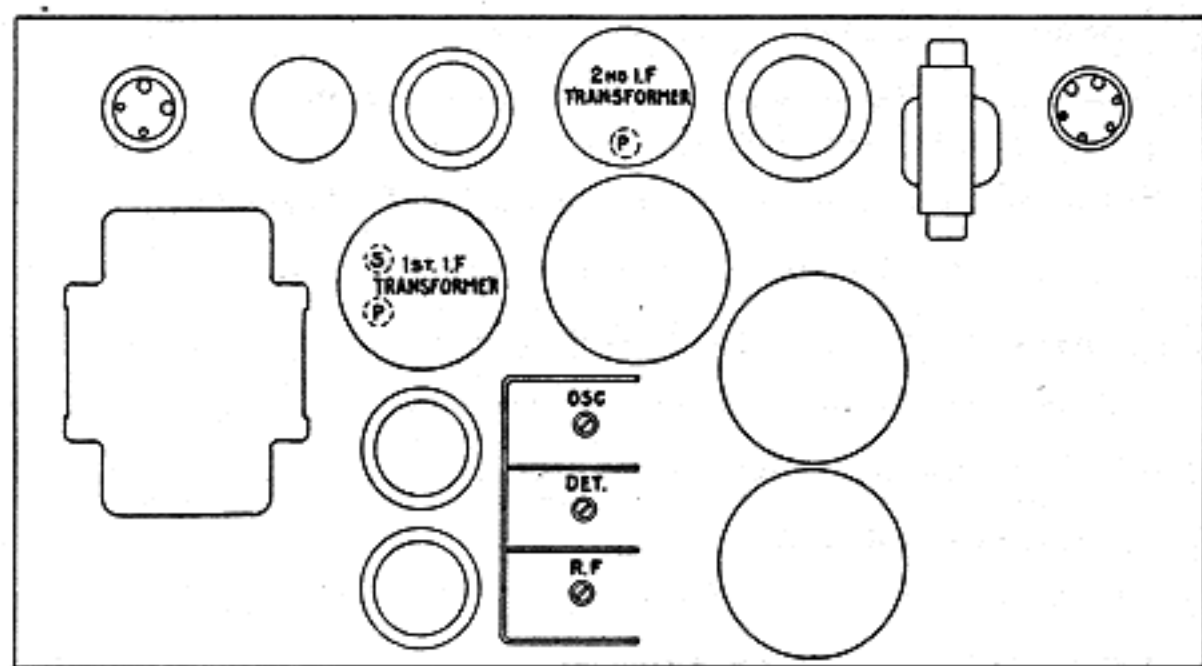


Figure C—Location of Line-up Capacitors

tinuously variable type tone control, "airplane" dial and the inherent sensitivity, selectivity and tone quality of the superheterodyne.

A feature is a Range Switch that allows reception of signals either of the broadcast band or higher frequencies. With the switch in the broadcast band position, the frequency range is from 540 to 1500 K. C. At the higher frequency position, the receiver covers the 1600 to 3500 K. C. band. Figure A shows the schematic circuit, Figure B the wiring diagram and Figure C the location of the line-up capacitors.

The circuit consists of an R. F. stage using Radiotron RCA-58, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage using Radiotron RCA-58, an RCA-2B7 functioning as a combined second detector and automatic volume control, an output stage using the new heater Pentode RCA-2A5 and the RCA-80 functioning as a rectifier.

RADIOTRON SOCKET VOLTAGES

115 Volts, A. C. Line—No Signal

Radiotron No.	Cathode to Control Grid, Volts	Cathode to Screen Grid, Volts	Cathode to Plate, Volts	Plate Current M. A.	Heater Volts
1. RCA-58 R. F.	3.5	100	260	5.0	2.32
2. RCA-2A7 1st Det. Osc.	5.5*	100*	260*	2.0*	2.32
3. RCA-58 I. F.	3.5	100	260	5.0	2.32
4. RCA-2B7 2nd Det. A. V. C.	4.5	50	90	0.7	2.32
5. RCA-2A5 Power	16.5	255	245	34.0	2.32
6. RCA-80 Rectifier		725 RMS		73.0 Total	4.82

*The voltages and current refer to the detector part of the tube.

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					
2747	Cap—Contact cap—Package of 5.....	\$0.50	6242	Resistor—2 megohms—Carbon type— $\frac{1}{4}$ watt—Located on antenna coil (R1)—Package of 5.....	\$1.00
2816	Resistor—1,000 ohms—Carbon type— $\frac{1}{2}$ watt (R5)—Package of 5.....	1.00	6282	Resistor—60,000 ohms—Carbon type— $\frac{1}{2}$ watt (R6, R11, R16)—Package of 5.....	1.00
3048	Resistor—500,000 ohms—Carbon type— $\frac{1}{2}$ watt (R18)—Package of 5.....	1.00	6303	Resistor—20,000 ohms—Carbon type— $\frac{1}{2}$ watt (R7)—Package of 5.....	1.00
3076	Resistor—1 megohm—Carbon type— $\frac{1}{2}$ watt (R8)—Package of 5.....	1.00	6512	Capacitor—0.005 mfd. (C31).....	.28
3252	Resistor—100,000 ohms—Carbon type— $\frac{1}{2}$ watt (R4, R17)—Package of 5.....	1.00	6571	Capacitor—10.0 mfd. (C37).....	1.20
3529	Socket—Dial lamp socket.....	.32	6614	Glass—Station selector dial glass.....	.30
3556	Capacitor—0.05 mfd.—Located on antenna coil (C2).....	.34	6615	Ring—Retaining ring for dial glass—Package of 5.....	.34
3572	Socket—7-contact Radiotron socket.....	.38	6616	Bezel—Metal bezel for station selector dial.....	.50
3594	Resistor—50,000 ohms—Carbon type— $\frac{1}{2}$ watt (R19)—Package of 5.....	1.00	6620	Capacitor—Comprising one 0.005 and one 0.035 mfd. capacitors (C35, C36).....	.50
3616	Capacitor—300 mmfd. (C27, C30).....	.34	6672	Screen—Translucent screen for dial light—Package of 5...	.30
3620	Capacitor—770 mmfd. (C20).....	.40	6673	Pointer—Station selector indicator—Package of 5.....	.64
3622	Shield—Radiotron shield—Second detector and output....	.36	6676	Socket—6-contact output Radiotron socket.....	.40
3630	Resistor—10,000 ohms—Carbon type—3 watt (R2).....	.25	6680	Condenser—3-gang variable tuning condenser.....	3.80
3639	Capacitor—0.02 mfd. (C33).....	.25	6681	Tone control (R21, S1).....	1.25
3682	Shield—Radiotron shield—Oscillator and first detector....	.22	6682	Volume control (R12).....	1.25
3702	Capacitor—0.25 mfd. (C7, C32).....	.42	6683	Coil—Antenna coil (L1, L2, C2, R1).....	1.38
3711	Capacitor—80 mmfd. (C16).....	.40	6684	Coil—Detector coil (L3, L4).....	1.10
3768	Screw—Square head—No. 6-32- $\frac{1}{4}$ " set screw for condenser drive—Package of 10.....	.35	6685	Coil—Oscillator coil (L5, L6).....	1.05
3783	Capacitor—9 mmfd. (C1, C8)—Package of 2.....	.50	6686	Transformer—First intermediate frequency transformer (L7, L8, C22, C23).....	1.80
3789	Shield—Radiotron shield—R. F. and I. F.....	.25	6687	Transformer—Second intermediate frequency transformer (L9, L10, C26).....	1.78
3859	Socket—4-contact Radiotron socket.....	.30	6688	Shield—Antenna, detector or oscillator coil shield.....	.60
3861	Capacitor—Adjustable capacitor.....	.78	6689	Switch—Range switch.....	1.48
3877	Capacitor—0.1 mfd. (C14, C34).....	.32	6690	Transformer—Output transformer (T2).....	1.46
3878	Screw—No. 4-40 screw and washer assembly for fastening station selector indicator—Package of 20.....	.25	6691	Capacitor pack—Comprising one 8.0 mfd. and three 4.0 mfd. capacitors (C15, C24, C29, C38).....	2.16
3891	Resistor—5,000 ohms—Carbon type—1 watt (R9, R10)—Package of 5.....	1.10	6693	Drive—Variable tuning condenser drive assembly complete.....	1.40
3892	Resistor—600 ohms—Carbon type— $\frac{1}{2}$ watt (R3)—Package of 5.....	1.00	6722	Dial—Station selector dial—Package of 5.....	1.20
3893	Resistor—5,000 ohms—Carbon type— $\frac{1}{2}$ watt (R14)—Package of 5.....	1.00	7485	Socket—6-contact Radiotron socket.....	.40
3894	Capacitor—820 mmfd. (C10).....	.36	9441	Transformer—Power transformer—105-125 volts—50-60 cycles (T1).....	4.92
3895	Capacitor—950 mmfd. (C3).....	.40	9442	Transformer—Power transformer—105-125 volts—25-40 cycles.....	6.80
3896	Capacitor—0.05 mfd. (C9, C25, C28).....	.36	9443	Transformer—Power transformer—200-250 volts—50-60 cycles.....	5.04
3897	Resistor—400 ohms—Carbon type—1 watt (R20)—Package of 5.....	1.10	10194	Ball—Steel ball for condenser drive assembly—Package of 20.....	.25
3898	Knob—Station selector, volume control, tone control or range switch knob—Package of 5.....	.90	REPRODUCER ASSEMBLIES		
6188	Resistor—2 megohms—Carbon type— $\frac{1}{2}$ watt (R13)—Package of 5.....	1.00	8969	Cone—Reproducer cone (L11)—Package of 5.....	6.35
6228	Resistor—200,000 ohms—Carbon type— $\frac{1}{2}$ watt (R15)—Package of 5.....	1.00	9444	Coil—Field coil, magnet and cone support (L12).....	5.00
			9445	Reproducer complete.....	7.14

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