

# Instructions for RCA Victor 310

## Five-Tube, Double-Range Superheterodyne Radio-Phonograph Console

### INSTALLATION

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

**Phonograph**—Remove the packing material from the phonograph compartment. With the speed shifter (lever projecting beneath turntable at front left-hand corner) set in the outward (78 R. P. M.) position, mount the turntable (packed in outfit package) on the motor spindle. Make sure that the drive pin engages the slot in the turntable hub. Insert the used-needle cup (also in outfit package) in the opening provided.

**Antenna and Ground**—An antenna 25 to 75 feet long, including the lead-in and ground connections, is recommended. The antenna should be well insulated from all objects, and should not be run close to or parallel with electric circuits inside or outside the building. Generally, an indoor antenna of short or medium length should be found satisfactory. An outdoor antenna of greater length may provide some increase in the receiving range, and is recommended for localities remote from broadcasting stations. When the receiver is installed in a building of metallic construction, an outdoor antenna is *required* for satisfactory results.

A *good* ground connection is essential for best performance. It should be as short and direct as possible, and preferably should be made to a cold water pipe. 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 connections 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 rating label at the rear of the receiver chassis.

**Radiotrons**—The instrument is equipped and tested at the factory with RCA Radiotrons and is shipped with the tubes in the sockets. The set is therefore ready to operate when it is removed from the carton and external connections are made as described in the foregoing.

If, when first installed, the receiver does not operate or performs imperfectly, one or more of the tubes, shields or dome terminal leads may have been jarred loose in shipment. Remove the back cover of the cabinet and refer to the tube location diagram on the rating label. *Make certain:*

- (a) That all tubes are in the proper sockets and pressed down firmly. *Never apply power to the instrument unless all Radiotrons are in place.*
- (b) That all shields are rigidly in place over the Radiotrons shown by double circles on the diagram.
- (c) That the spring connectors at the ends of the short flexible leads are securely attached to the dome terminals of the proper Radiotrons as indicated on the diagram.

### OPERATION

#### CONTROLS

The instrument has five operating controls, four of which are located on the front panel of the cabinet, as follows:

- (1) **Radio Volume Control (Combined with Power Switch) (Left-hand Knob)**—This control is provided with an illuminated dial. In the extreme counter-clockwise position the power switch is "off." Rotating the knob slightly clockwise turns on the power—further rotation increases the volume.
- (2) **Tone Control (Middle Knob)**—The extreme clockwise position gives full range reproduction. When the knob is turned counter-clockwise, high-frequency (treble) response is decreased.
- (3) **Station Selector (Right-hand Knob—Symmetrical with Radio Volume Control)**—This control is equipped with an illuminated dial, calibrated to facilitate location and identification of stations (add one cipher to scale numerals to obtain frequency in kilocycles).

- (4) **Frequency Range Switch (Below and to Right of Station Selector)**—With this knob in the *counter-clockwise* position, broadcasting stations in the 540–1500 kilocycle range will be received (frequencies in this range are indicated by the large numerals adjacent to the scale graduations). With the knob in the *clockwise* position, stations operating in the 1400–2800 kilocycle range will be received (frequencies in this range are indicated approximately by the small numerals at the top of the dial), as follows:
  - (a) **Police Calls**—At dial settings near "80" for stations transmitting at 1712 kilocycles, and at "118–122" for stations operating in the 2450 kilocycle band.
  - (b) **Amateur Radio "Phone"**—At dial settings "90–95" (assigned band 1900–2000 kilocycles).
  - (c) **Aviation Reports, Airport Beacons, Etc.**—At dial settings "95–118" (assigned band 2000–2400 kilocycles).
  - (d) **Amateur Radio "CW" (Code)**—At dial settings "80–90" (assigned band 1715–1900 kilocycles). Signals of this class are normally unintelligible or inaudible with this type of receiver.

The fifth control is located in the phonograph compartment, at the right-hand front corner of the motor board, namely:

- (5) *Record Volume Control (Combined with Radio-Record Switch)*—For radio operation, this control must be set in the extreme counter-clockwise position. A slight clockwise rotation transfers the switch for phonograph operation—further rotation increases the volume on records.

## RADIO OPERATION

To operate the receiver, proceed as follows:

1. Set the radio-record transfer switch for "Radio" by turning the Record Volume Control to the extreme counter-clockwise position.

2. Set the Frequency Range Switch for the desired frequency band—see paragraph (4) under "CONTROLS."

3. Turn on the power and set the Radio Volume Control fully clockwise for maximum volume—reduce the setting if too noisy after allowing approximately one-half minute for the tubes to heat.

4. Turn the Station Selector slowly over the range of the dial until a desirable station program is heard.

**NOTE**—The majority of stations in the 1400–2800 kilocycle band do not offer continuous programs. Police calls are usually intermittent, at regular or irregular intervals. Strong local 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 1400–2800 kilocycles.

5. Accurate tuning for *best* reproduction is accomplished as follows:

- (a) Turn the Radio Volume Control counter-clockwise (if necessary) until the volume is at a low level.
- (b) Adjust the Station Selector carefully to the position mid-way between the points where the quality becomes poor or the signal disappears.
- (c) Adjust the Volume Control to obtain the desired sound level.

6. Adjust the Tone Control to obtain the desired tone quality, or turn it counter-clockwise to reduce noise interference.

7. When through operating, turn the Radio Volume Control knob fully counter-clockwise until the "off" click of the power switch is heard.

## PHONOGRAPH OPERATION

Electric phonograph facilities are provided in this instrument for playing either standard (78 R. P. M.) records or long-playing (33 $\frac{1}{3}$  R. P. M.) records. Proceed as follows:

1. Turn the Record Volume Control clockwise for record reproduction and set this control near the middle of its range.

2. Apply power by turning the Radio Volume Control knob slightly clockwise. Several seconds will be required for the Radiotrons to heat before reproduction is possible.

3. Place a record on the turntable. Insert a *new* needle in the pickup as far as it will go and tighten the needle screw. For long-playing (33 $\frac{1}{3}$  R. P. M.) records, use *only* the *orange Chromium* needle. For standard (78 R. P. M.) records, use the latter needle or, if preferred, either the *green Chromium* or the full-volume (full tone) *Tungstone* needle. Ordinary steel needles (full volume or full tone) can also be used on 78 R. P. M. records, provided a new needle is inserted for each selection.

**NOTE**—With care, the orange Chromium needle should play 25, the green Chromium 75 to 100, and the Tungstone 100 to 200 records. *Never re-insert in the pickup a Chromium needle which has been used (however slightly), as damage to the record grooves would result.* Do not use Tungstone needles with thin flexible records or with transparent-faced (illustrated) records.

4. Pull the starting lever (right-hand side of turntable) forward to start the turntable. Set the speed shifter (left-hand side of turntable) for the speed (78 or 33 $\frac{1}{3}$  R. P. M.) corresponding to the record on the turntable. Then place the needle on the smooth outer surface of the record and slide it into the first groove.

5. Adjust the Record Volume Control to obtain the desired volume.

6. For most faithful reproduction, the Tone Control should be left in the fully clockwise position while using the phonograph. Turning this control counter-clockwise decreases the treble response and reduces the needle scratch noise—particularly noticeable on old records—reproduced by the loudspeaker.

7. When the record has been played, lift the pickup and move it to the right so as to clear the turntable, thereby stopping the motor. (When through playing an eccentric groove record the motor will stop automatically.)

8. When through operating, switch off the power by turning the Radio Volume Control knob to the extreme counter-clockwise position. The pickup should never be left with the needle resting on the record (or turntable) when not operating the phonograph.

**Lubrication**—The motor should be lubricated with light oil once every six months. Two oil holes on top of the motor are accessible when the turntable is removed. The ball bearing mechanism under the turntable should be lubricated once a year by prying off the cover and packing with vaseline or light motor grease, being careful to prevent any dirt particles from entering with the grease. Make sure that the speed shifter is in the outward (78 R. P. M.) position before replacing the turntable on the spindle.

# SERVICE DATA

Voltage Rating.....105-125 Volts  
 Frequency Rating.....25, 50 and 60 Cycles  
 Power Consumption.....60 Cycles, 95 Watts  
 Number and Types of Radiotrons.....1 UX-280,  
 1 RCA-2A5, 1 RCA-58, 1 RCA-57, 1 RCA-2A7—Total, 5  
 Undistorted Output.....1.75 Watts  
 Frequency Range.....540 K. C. to 1500 K. C.  
 and 1400 K. C. to 2800 K. C.

This combination radio-phonograph instrument uses a five-tube Super-Heterodyne receiver incorporating a dynamic loudspeaker, continuously variable tone control, single heater type Pentode output tube and the inherent sensitivity, selectivity and tone quality of the Super-Heterodyne.

The standard two speed motor board equipment is used and the entire assembly enclosed in a table type cabinet.

A special feature is the Range Switch that allows reception of signals either of the broadcast band or higher frequencies. Figure B shows the assembly wiring, Figure C the schematic diagram and Figure D the chassis wiring diagram. 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 1400 to 2800 K. C. band.

The circuit consists of an R. F. stage, a combined oscillator and first detector in the RCA-2A7 tube, an intermediate stage consisting of a transformer using two tuned circuits, a second detector, an output tube and a rectifier.

## Line-up Capacitor Adjustment

The line-up capacitor adjustments for the I. F. stage and the gang capacitors are made in the following manner:

- (a) Procure a modulated oscillator giving a signal at 175 K. C., 600 K. C., 1400 K. C., and 2440 K. C. An output meter and non-metallic screw driver are also necessary.

- (b) The I. F. line-up capacitors should be first adjusted. This is done by placing the oscillator in operation at 175 K. C., coupling its output between the control grid and ground of the first detector, connecting the output meter across the cone coil of the loudspeaker and adjusting the two I. F. line-up capacitors until maximum output is obtained.

- (c) After the I. F. circuits are aligned, the broadcast band R. F. is adjusted at 1400 K. C. This is done with the Range Switch at the broadcast position. A similar manner is used as that of the I. F., except that the oscillator is set at 1400 K. C., its output is connected from antenna to ground of the receiver, and the dial is set at 140. The adjustment is made with the trimming capacitors located on top of the gang capacitor and each capacitor is adjusted for maximum output.

- (d) Set the oscillator at 600 K. C. Tune in the signal with the receiver until a maximum deflection is obtained in the output meter. Now adjust the 600 K. C. series capacitor, located at the bottom of the chassis, until a maximum deflection is obtained in the output meter. Rock the tuning capacitor back and forth while making this adjustment as the tuning capacitor and oscillator series capacitor adjustments interlock.

- (e) Change the frequency of the oscillator to 1400 K. C. and set the dial at 140. Again make the adjustments given under (c).

- (f) The high frequency band is adjusted at 2440 K. C. This is done in a similar manner to the R. F. adjustments except that the oscillator is set at 2440 K. C., the dial at 120 and the Range Switch in the high frequency position. The line-up capacitors on the selector switch are adjusted for maximum output at this frequency.

Service data for the magnetic pickup is included below.

## RADIOTRON SOCKET VOLTAGES

115 Volt A. C. Line

### MAXIMUM VOLUME CONTROL SETTING—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. Amplifier	3.0	95	250	5.0	2.33
2. RCA-2A7 First Detector Oscillator	3.0	95	250	3.0	2.33
3. RCA-57 Second Detector	6.0	89	170	0.3	2.33
4. RCA-2A5 Power Amplifier	18.0	235	220	32.0	2.33
5. RCA-80 Rectifier					2.33
275 Volts PLATE TO PLATE—60 M. A. TOTAL					4.82
TOTAL CATHODE CURRENT—11 M. A.					

## SERVICE DATA ON MAGNETIC PICKUP

This magnetic pickup is of a new design that results in excellent reproduction. While in physical appearance, it is similar to that of the older type, details of construction are considerably different. It consists of essentially a chromium steel magnet, two thin pole pieces, a mechanism support and bracket, a coil, and an armature.

### REPLACING MAGNET COIL, PIVOT RUBBERS, OR ARMATURE

In order to replace a defective magnet coil or hardened pivot rubbers, it is necessary to proceed as follows:

- (a) Remove the pickup cover by removing the center holding screw and needle screw.
- (b) Remove the pickup magnet and the magnet clamp by pulling them forward.
- (c) Unsolder the coil leads and remove the mechanism assembly from the back plate by releasing the two mounting screws.
- (d) Remove screws A and B, Figure A, and then remove the mechanism assembly from the pole pieces.
- (e) The coil or the front pivot rubber may now be removed and replaced. If it is desired to replace the rear pivot rubber, then the end of the armature soldered to the mechanism support must be unsoldered.
- (f) The mechanism should now be reassembled except for the magnet which must be magnetized. After being magnetized the mechanism—with the pole pieces upward, should be placed so that the magnet may be slid from the magnetizer onto the pole pieces without breaking physical contact. After placing the pole pieces on the magnet, the entire assembly should be remagnetized thoroughly, being careful not to change polarity.

- (g) After reassembling to the mechanism, the entire assembly should be fastened to the back plate by means of the two screws provided, making sure support is down against pads on back. At the same time, the metal dust cover must be placed in position.

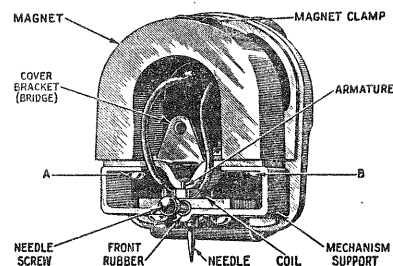
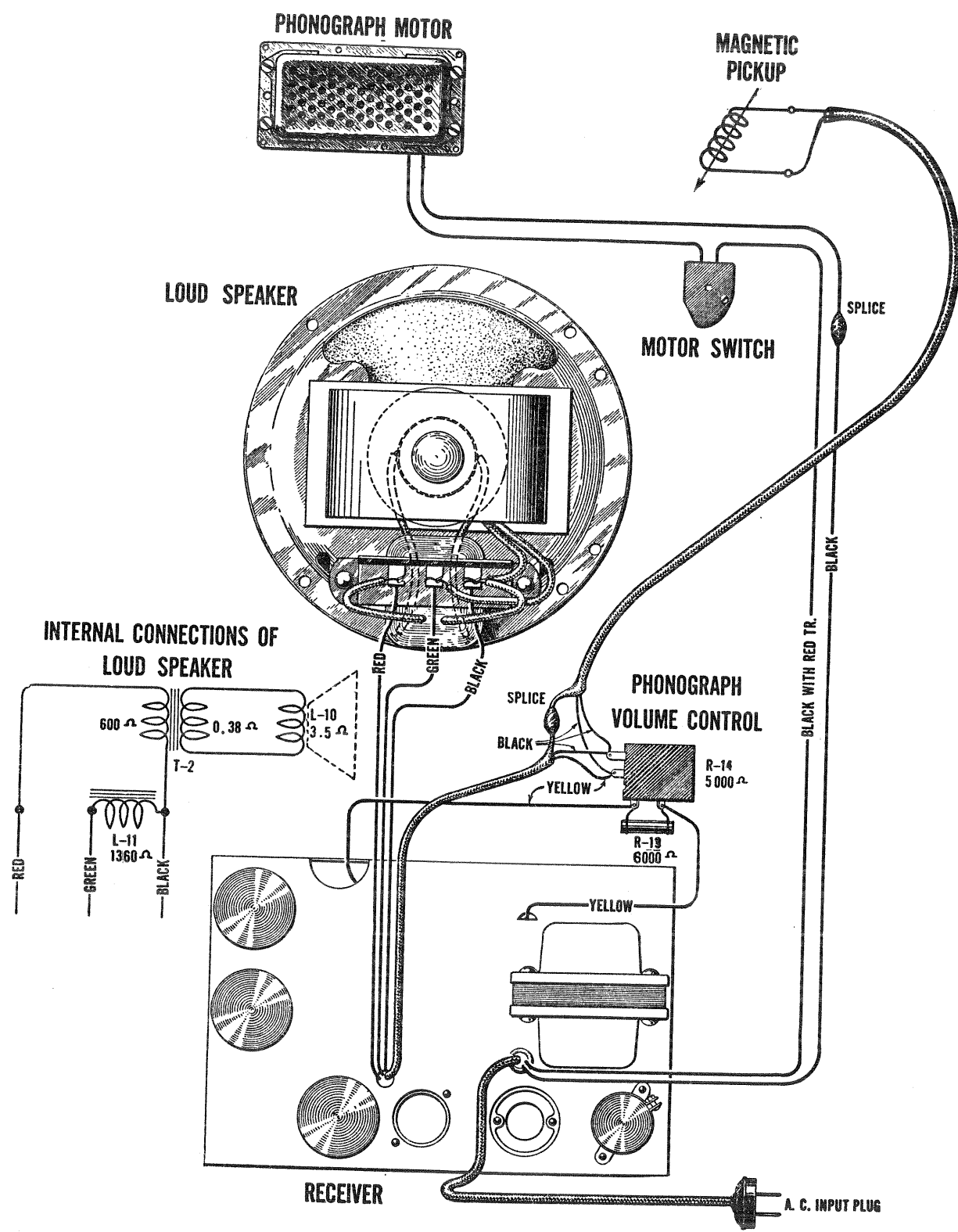
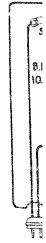


Figure A—View of Pickup showing parts

- (h) After remagnetizing, it is necessary to correctly center the armature. This may be done quite accurately by feeling its play after the needle is inserted. A little practice will quickly show which way an adjustment is necessary to have the armature centered properly. The adjustment is made by loosening screws A and B (Figure A), and sliding the mechanism slightly in relation to the pole pieces.
- (i) The cover may be now replaced over the entire assembly, and the pickup returned to the tone arm.

Only rosin core solder should be used for any soldering in conjunction with the pickup. However, if great care to wipe clean and use as small amount as possible is exercised, paste or liquid flux may be used for soldering the end of the spring.



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Figure B—Assembly Wiring

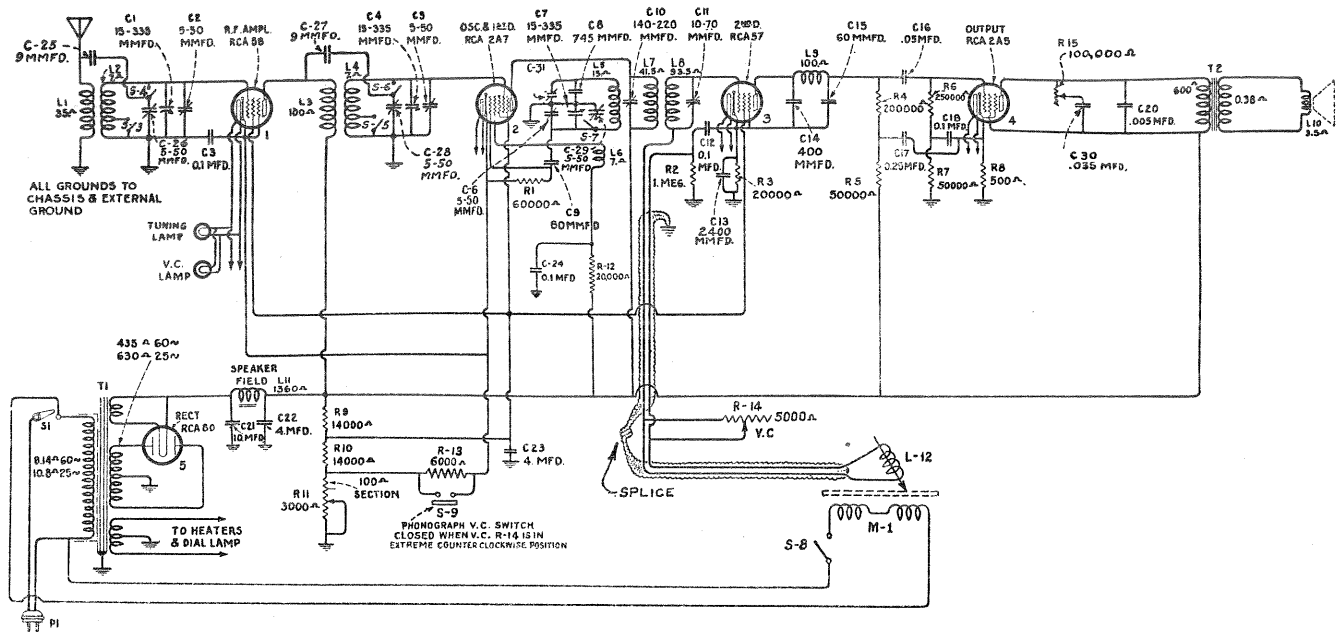


Figure C—Schematic Circuit Diagram—Note: R-11 may be either 3000 ohms or 4500 ohms

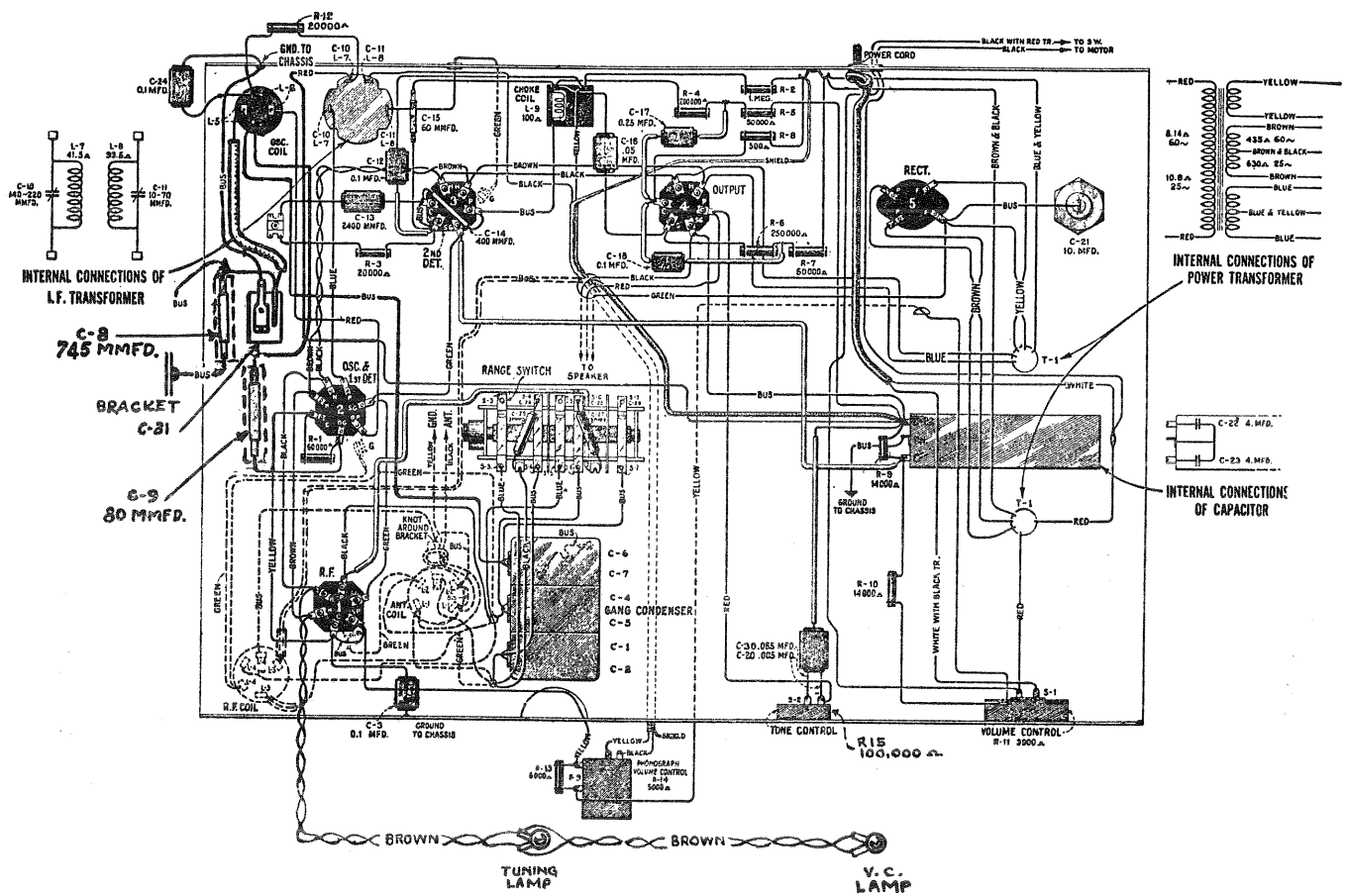


Figure D—Wiring Diagram—C-31 is 15-70 mmfd.

# Instructions for RCA Victor 330

## Seven-Tube Double-Range Superheterodyne Radio-Phonograph Combination

### INSTALLATION

**Preliminary**—After withdrawing the instrument from the shipping container and removing the packing framework bolted to the underside of the cabinet, take off the rear cover which is fastened by screws at the edges.

The motor is flexibly mounted and supported for shipment by a vertical wood prop from the floor of the cabinet. Remove this prop. Remove also the two red hex-head bolts which pass through the mounting rails, and the two wood blocks from between the motor board and the mounting rails. The motor board should then float freely on its spring suspension.

**Radiotrons**—The Radiotrons are shipped installed in the sockets. Before replacing the rear cover, refer to the tube location diagram on the license label inside the cabinet, and *make certain*:

- (a) That all tubes are in the proper sockets and pressed down firmly. *Never apply power to the instrument unless all Radiotrons are in place.*
- (b) That all shields are rigidly in place over the Radiotrons shown by double circles on the diagram.
- (c) 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 caps are pressed down firmly.

**NOTE**—For the RCA-55 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.

**Phonograph Compartment**—Raise the lid of the cabinet and remove the packing material from the playing compartment. Insert the used-needle cup (packed in outfit package) in the opening provided. With the speed shifter set in the outward (78 R. P. M.) position, install the turn-

table on the motor spindle. Make sure that the spindle drive key engages the slot in the turntable hub.

**Location**—The instrument should be located close to the antenna lead-in and ground connections, and near an electrical outlet.

**Antenna and Ground**—An antenna 25 to 75 feet long, including the lead-in and ground connections, is recommended. 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. Generally, an indoor antenna of short or medium length will be found satisfactory. An outdoor antenna of greater length, however, should improve reception and is recommended for localities remote from broadcasting stations. When the receiver is installed in a building of metallic construction, an outdoor antenna is *required* for satisfactory results.

A good ground connection is essential for best performance. It should be as short and direct as possible and preferably should be made to a cold water pipe. An approved ground clamp should be used to insure a tight and permanent connection.

Two flexible leads for connecting to the antenna and ground extend from beneath the base panel of the instrument. Connect the *black* lead to the antenna wire or lead-in and the *yellow* lead to the ground wire. Both connections 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—RADIO

The radio operating controls, located on the front panel, are shown in Figure 1. Proceed as follows:

1. Set the Transfer Switch in the counter-clockwise position, for radio reception.
2. Apply power by turning the Tone Control clockwise from the "off" position; continue rotation of this control to the opposite extremity for full-range reproduction. Several seconds are required for the Radiotrons to heat before reception is possible.
3. Set the Frequency Range Switch for the band desired, as follows:
  - (a) *Counter-clockwise*—540–1500 kilocycle broadcast band. The dial scale reads directly in kilocycles for this band when one cipher is added to the large numerals adjacent to the graduations.
  - (b) *Clockwise*—1400–2800 kilocycles. Frequencies in this band are indicated approximately by the positions of

the small numerals at the top of the dial (add one cipher to obtain kilocycles). The following services are included in this band:

- (1) **Police Calls**—Stations operating at 1712 kilocycles, and between 2400 and 2500 kilocycles.
- (2) **Amateur Radio "Phone"**—Assigned band 1900–2000 kilocycles.
- (3) **Aviation Reports, Airport Beacons, Etc.**—Assigned band 2000–2400 kilocycles.
- (4) **Amateur Radio "CW" (Code)**—Assigned band 1715–1900 kilocycles. Signals of this class normally are unintelligible or inaudible with this type of receiver.

**NOTE**—The majority of stations in the 1400–2800 kilocycle band do not offer continuous programs. Police calls are usually intermittent, at regular or irregular intervals. Strong local 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 1400–2800 kilocycles.