

Instructions for RCA Victor Duo 301

Four-Tube Double-Range Superheterodyne Combination
(Table Model)

INSTALLATION

Setup—After unpacking the instrument, remove the rear panel of the cabinet (held in place by screws) and withdraw all material inserted to protect the tubes during shipment. Refer to the tube location diagram printed on the license label attached to the cabinet and *make certain*:

- (a) That all tubes are in the proper sockets and pressed down firmly.
- (b) That all shields are rigidly in place over the tubes shown by double circles on the diagram.
- (c) That the short flexible leads shown on the diagram are attached to the dome terminals of the proper tubes as indicated, and that the spring contact clips are pressed down firmly.

Replace the cabinet rear panel, feeding the antenna and ground wires (black and yellow, respectively) through the left-hand opening near the bottom of the panel and the power cord through the adjacent right-hand opening. Finally, raise the lid of the cabinet and remove all packing material from the phonograph playing compartment.

Location—The instrument should be placed upon a table or other level surface convenient to the antenna and ground connections and near an electrical outlet or lamp socket. Care should be taken to avoid restriction of natural ventilation through the cabinet as would occur with the set situated so that its back is flush with a wall of the room or with the instrument resting upon or close to a radiator or other heating device.

Antenna and Ground—A well-insulated outdoor antenna having a length of from 50 to 100 feet, including the lead-in wire, is recommended. It should be erected as high as conveniently possible and sufficiently remote from power lines and street railways to prevent excessive local interference. If the instrument is installed in a building of non-metallic construction, an indoor antenna ordinarily will afford satisfactory reception and may be considered the most practical. Buildings in which the roof or framework is of metal, however, form an effective shield which greatly impedes the passage of radio waves; to insure best results in such installations, therefore, an outdoor antenna is essential.

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

The two flexible insulated wires extending from the cabinet at the rear are provided to facilitate connections to the antenna and ground. Connect the *black* wire to the antenna lead-in and the *yellow* wire to the ground lead. 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 five operating controls, four located on the front panel of the cabinet, as follows:

- (1) **Power Switch and Radio Volume Control (Left-hand Knob)**—In the extreme *counter-clockwise* position, the power switch is "off." Rotating the knob slightly *clockwise* turns the power "on"—further rotation increases the volume on radio reception.
- (2) **Station Selector (Upper Middle Knob)**—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).
- (3) **Tone Range Switch (Lower Middle Knob)**—This switch has two positions, the *clock-*

wise setting providing *full-range* reproduction. When the knob is turned *counter-clockwise*, treble response and static interference (when latter is present) will be reduced.

- (4) **Frequency Range Switch (Right-hand Knob)**—With this knob in its *counter-clockwise* position, stations transmitting in the 540–1500 kilocycle or broadcast range will be received (frequencies in this range are indicated by the large numerals adjacent to the scale graduations). When the knob is turned *clockwise*, the circuits are transferred to permit reception from stations operating in the 1600–3500 kilocycle range (frequencies in this range are indicated approximately by the small outer numerals), as follows:

- (a) **Police Calls**—At dial settings near "170" for stations transmitting at 1712 kilocycles and between "240" and "260" 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 above "240" (2500-3500 kilocycles).

The fifth control knob is located on the right-hand side of the cabinet and serves the following purpose:

- (5) **Record Volume Control**—The volume produced by a phonograph record will be increased upon rotation of this knob in a *clockwise* direction. When not operating the phonograph, this control should be turned fully *counter-clockwise* in order to insure proper radio performance.

Radio Procedure

To operate the radio receiver, refer to the foregoing description of the controls and proceed as follows:

- 1. Set the Frequency Range Switch for the desired frequency band.

2. Apply power by turning the left-hand knob on the front panel slightly clockwise from the "off" position of the power switch, thus illuminating the dial—indicative of normal operation. Several seconds, however, will be required for the tubes to heat before reproduction is possible. Set the Radio Volume Control fully clockwise for maximum volume—reduce the setting if too noisy.

- 3. Rotate the Station Selector slowly over the range of the dial until a desirable station program is heard.

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 Radio 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 best quality of reproduction.*

5. Adjust the Radio Volume Control to the desired volume level and set the Tone Range Switch for the preferred tone quality.

6. When through operating, switch the power "off" by turning the left-hand knob on the front panel to its extreme counter-clockwise position.

Phonograph Procedure

Facilities for electrical reproduction of standard-speed (78 revolutions per minute) phonograph records are contained in this instrument. To play records of this type, swing back the hinged lid of the cabinet (remove the lid, if desired, by sliding from its hinges) and proceed as follows:

1. Turn the power "on," as for radio reception, by a slight clockwise rotation of the left-hand knob on the front panel. To prevent radio interference, this knob should not be turned beyond that point at which the "click" of the power switch is heard. If the receiver is tuned to a local or strong station, it may be found necessary to rotate the station selector a slight amount to eliminate such interference.

2. Place the record upon the turntable and insert a *new* needle—*Chromium* (orange or green shank), *Tungstone* (full volume) or *steel* (full volume)—in the electric pickup. To insert the needle, first loosen the knurled screw on the front of the pickup, push the needle to the full depth of the opening and tighten the screw.

NOTE—For best reproduction when using steel needles, a new needle should be substituted after each selection. With care, the *orange* Chromium needles may be used to play 25, and the *green* Chromium needles from 75 to 100 recordings. Chromium needles should never be replaced in the pickup (if removed for any reason before completely worn), as undue record wear would result. Tungstone needles are capable of playing from 100 to 200 recordings, provided care is taken not to injure the point. Do not use *Tungstone* needles on thin, flexible records or on transparent-faced (illustrated) records.

3. Start the turntable rotating in a *clockwise* direction by twirling with the hand. When normal speed is attained, lower the pickup carefully onto the record, starting the needle at the outside groove.

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

5. After the selection has been played, lift the pickup and swing it to the right so as to clear the turntable. While changing records, the turntable either may be left rotating or may be stopped by pressure of the hand, as found most convenient.

6. When through operating, return the Record Volume Control to its counter-clockwise extremity and switch the power "off." The pickup should be placed upon the felt-covered wooden support at the right-hand side of the turntable when not operating the phonograph—do not leave the pickup resting on the record or turntable. Replace and close the cabinet lid.

Lubrication—Lift off the turntable at least once each year and apply a few drops of high-grade light machine oil around the *outside* of the shaft bushing to provide lubrication for the metal washer upon which the motor field member floats. The shaft bushing is self-lubricating; however, no harm will result if excess oil runs inside the bushing.

SERVICE DATA

Voltage Rating.....105-125 Volts
 Frequency Rating.....25, 50 and 60 Cycles
 Power Consumption.....45 Watts
 Number and Types of Radiotrons—
 1 RCA-6A7, 1 RCA-6F7, 1 RCA-41, 1 RCA-1-V
 Undistorted Output.....1.9 Watts
 Frequency Range.....540-1500 K. C. and 1600-3500 K. C.

This table type combination instrument consists of a four tube super-heterodyne chassis and a new compactly constructed motor board assembly. The receiver incorporates features such as wide tuning range, electrodynamic loudspeaker, two-point tone control, illuminated dial and the inherent sensitivity, selectivity and tone quality of the super-heterodyne.

The following description of the circuit describes several new design features which are incorporated in this receiver.

The first tube is a combined first detector and oscillator using Radiotron RCA-6A7. Separate tuned circuits are provided for each function. The detector coil is tapped so that the tuning range may be extended merely by shorting out a portion of the coil. The oscillator circuit is not tapped, the high frequency range being obtained by use of its second harmonic instead of the fundamental for obtaining the I. F. frequency.

The next tube is a combined I. F. stage and second detector using Radiotron RCA-6F7. It has two sets of elements, one being used as a screen grid I. F. amplifier and one as a triode detector. The I. F. frequency in this receiver is 460 K. C. The output stage is a single Pentode RCA-41.

The rectifier is an RCA-1-V used in a half-wave rectifying circuit. A feature of this circuit is that only one transformer secondary is used. This is accomplished by having a cathode type rectifier, a series arrangement of filaments and a tapped secondary winding.

Figure A shows the pickup details, Figure B the assembly wiring, Figure C the schematic circuit and Figure D the wiring diagram and Figure E the loudspeaker wiring.

RADIOTRON SOCKET VOLTAGES

120 Volt, 60 Cycle Line—Maximum Volume Control
 Setting—No Signal

Radiotron No.		Cathode to Control Grid, Volts D. C.	Cathode to Screen Grid, Volts D. C.	Cathode to Plate, Volts D. C.	Plate Current, M.A.	Heater or Filament, Volts
RCA-6A7	First Detector	1.25	70	235	2.5	6.3
	Oscillator	—	—	180	3.5	
RCA-6F7	I. F.	1.25	70	235	5.5	6.3
	Second Det.	19*	—	145*	0.4	
RCA-41	Output	17	240	230	26.5	6.3
RCA-1-V	Rectifier	—	—	335 RMS	50	6.3

* Actual voltage cannot be measured with ordinary voltmeter.

Line-Up Adjustments

The detector and oscillator line-up trimmer capacitors are adjusted by setting both the dial and an external oscillator first at 1400 K. C. and

adjusting the tuning capacitor trimmer capacitors for maximum output, then changing the oscillator frequency and dial setting to 600 K. C. and adjusting the submounted trimmer capacitor for maximum output. The I. F. adjustments are made by adjusting the two trimmer capacitors located on the first I. F. transformer for maximum output when a 460 K. C. signal is connected between the control grid of the first detector and ground. Be sure and set the station selector at a point where no signal is being received when making I. F. adjustments.

Pickup Service Data

The magnetic pickup and tone-arm assembly of this instrument is of new design and unique construction. Service work will consist of centering the armature, replacing the rubber pivots and replacing the magnet coil.

Disassembling the Pickup

The pickup may be disassembled in the following manner:

- Unsolder the two cable connections to the terminal strip.
- Remove the needle screw and screws "A" and "B."
- Remove the pickup assembly from the arm and housing.
- Unsolder the two magnet coil leads attached to the terminals and then remove screw E. This will allow the removal of the fibre terminal board.
- If centering the pickup armature is the only adjustment required, such centering can be done without removing the fibre terminal board indicated in (d). The armature is centered by loosening screw F, accessible through the hole shown, and holding the armature with the finger in proper position while screw F is tightened. "Feeling" the armature while deflecting it between its two extremes is the best manner of ascertaining proper centering. When centering, after work has been done or the magnet removed, it is important that the magnet be remagnetized while in place.
- If the coil or pivot rubbers are to be replaced, the pickup must be further disassembled. This is done by removing the magnet and then removing screws C and D. The pole piece may now be removed and the old coil and sleeve disassembled. Acetone will be found helpful for dissolving the old cement that holds the coil in place. The new coil, with its sleeve, may now be replaced and cemented in a similar position to that occupied by the old coil. Duco household or Ambroid cement may be used to hold the coil in place. Be careful to center the coil with its paper sleeve before cementing.
- The pivot rubbers are replaced by loosening the armature adjusting screw F and removing the armature from its bracket. The rubbers can then be removed by slipping them from each end of the pivot shaft.

It is important to remember that in all operations after reassembling but before placing in the tone arm, the pickup should be magnetized and the armature centered after remagnetizing. Magnetizing should be done by placing the pickup magnet on the magnetizer and sliding it onto the pole pieces, after magnetizing being careful not to break the magnetic circuit.

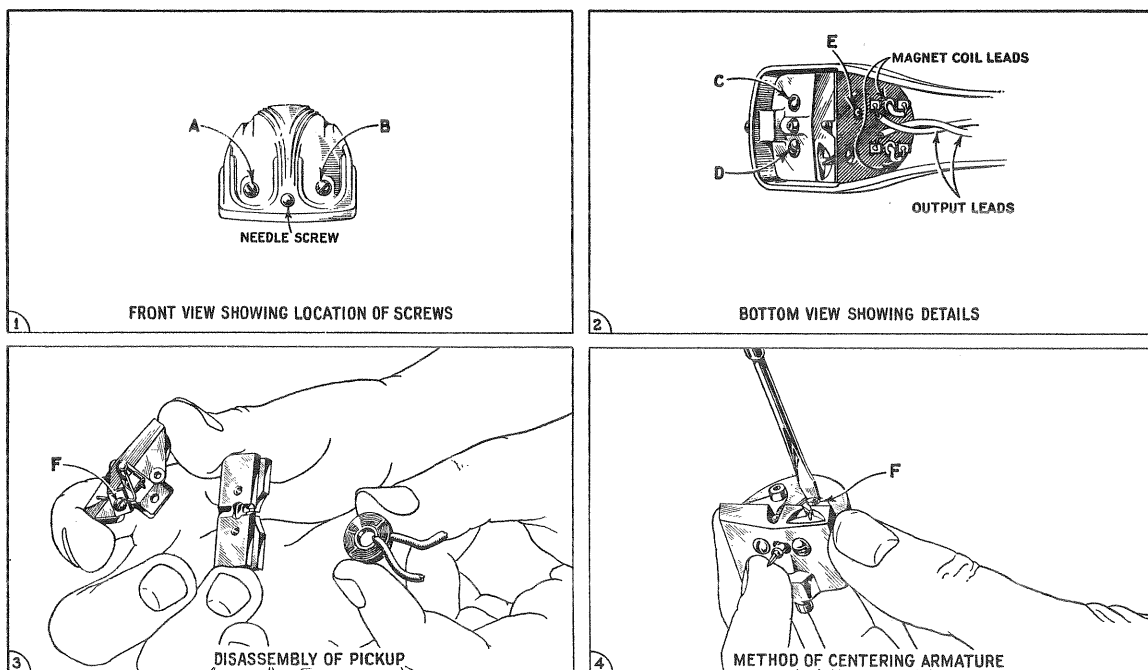


Figure A—Pickup Details

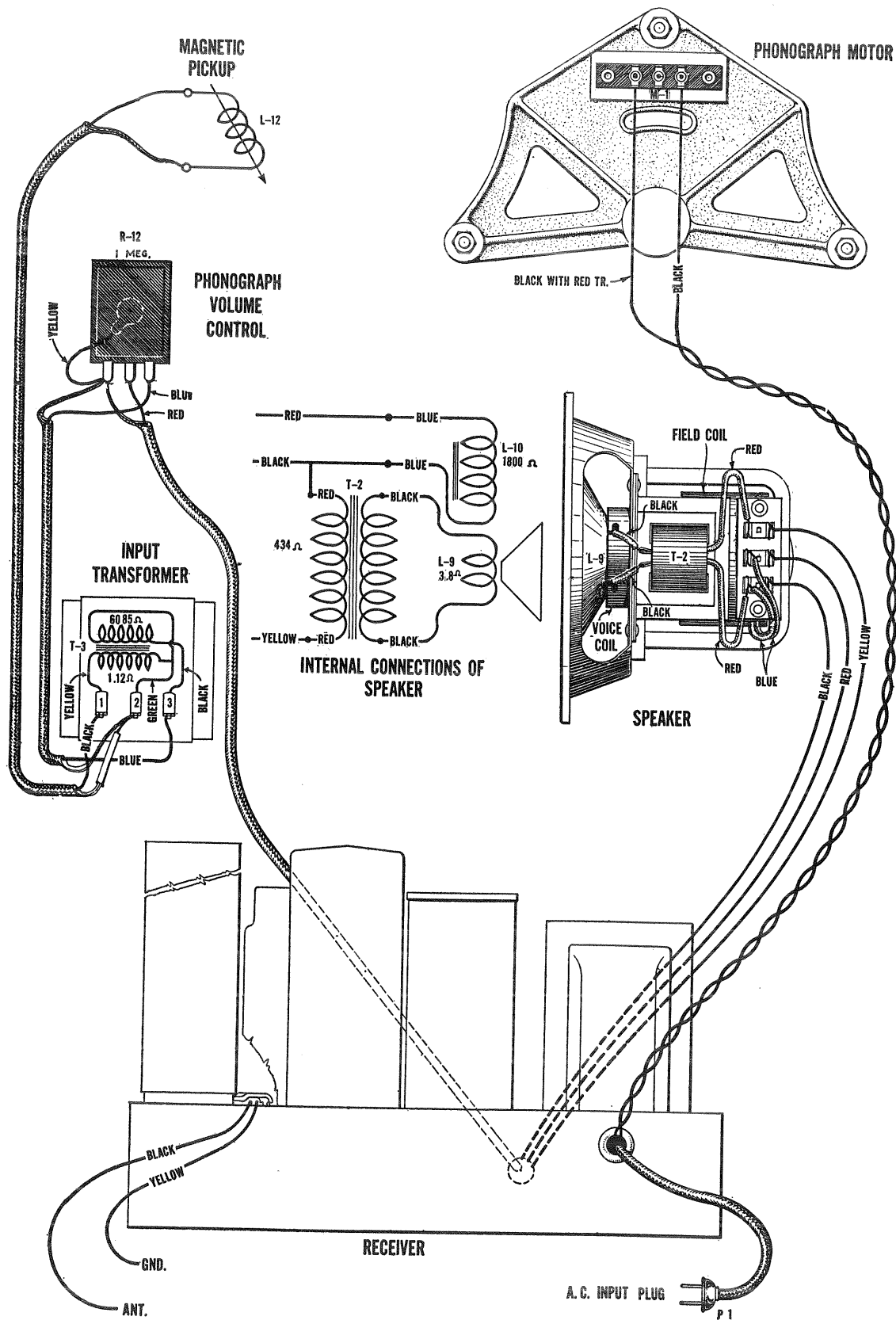


Figure B—Assembly Wiring

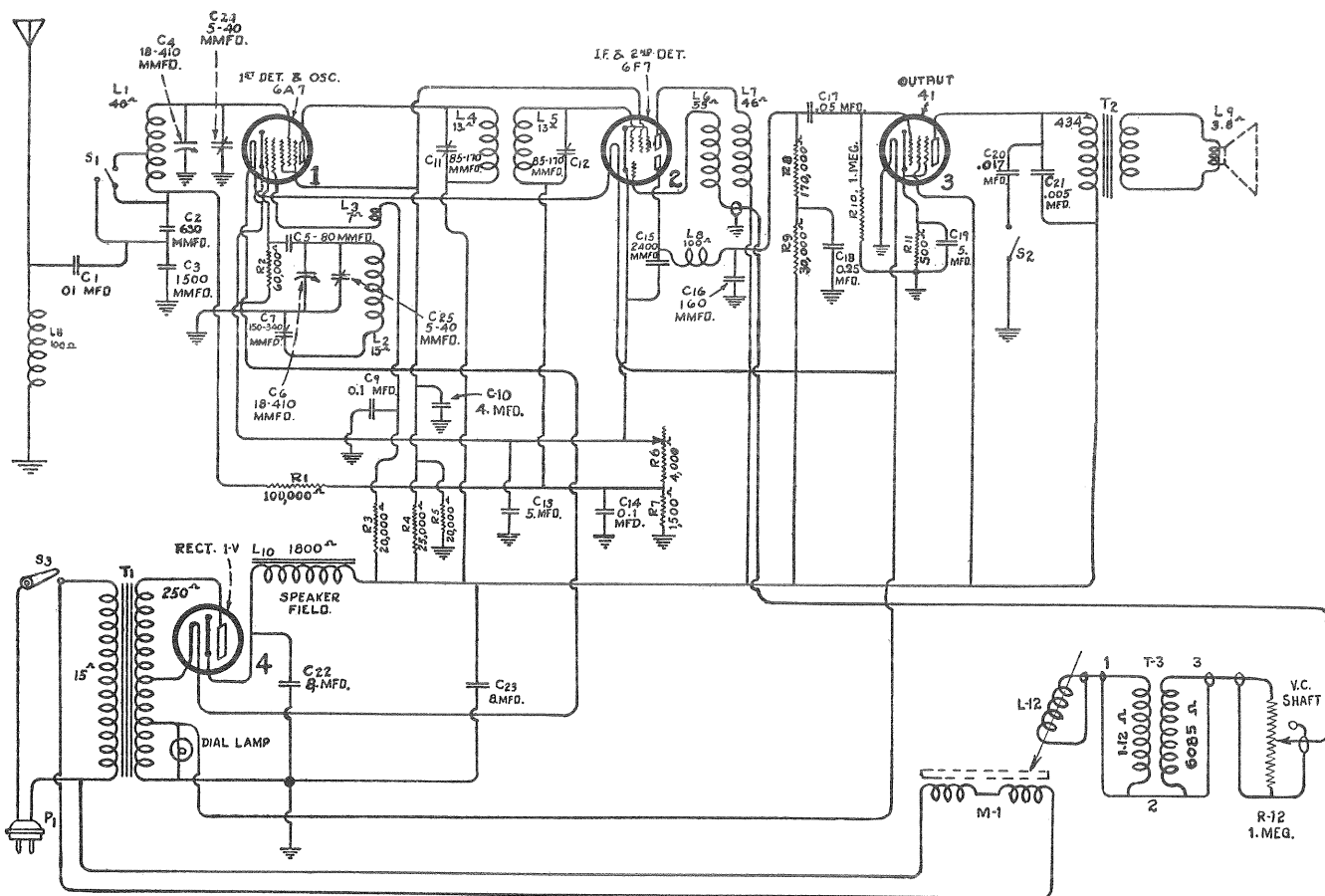


Figure C—Schematic Circuit Diagram

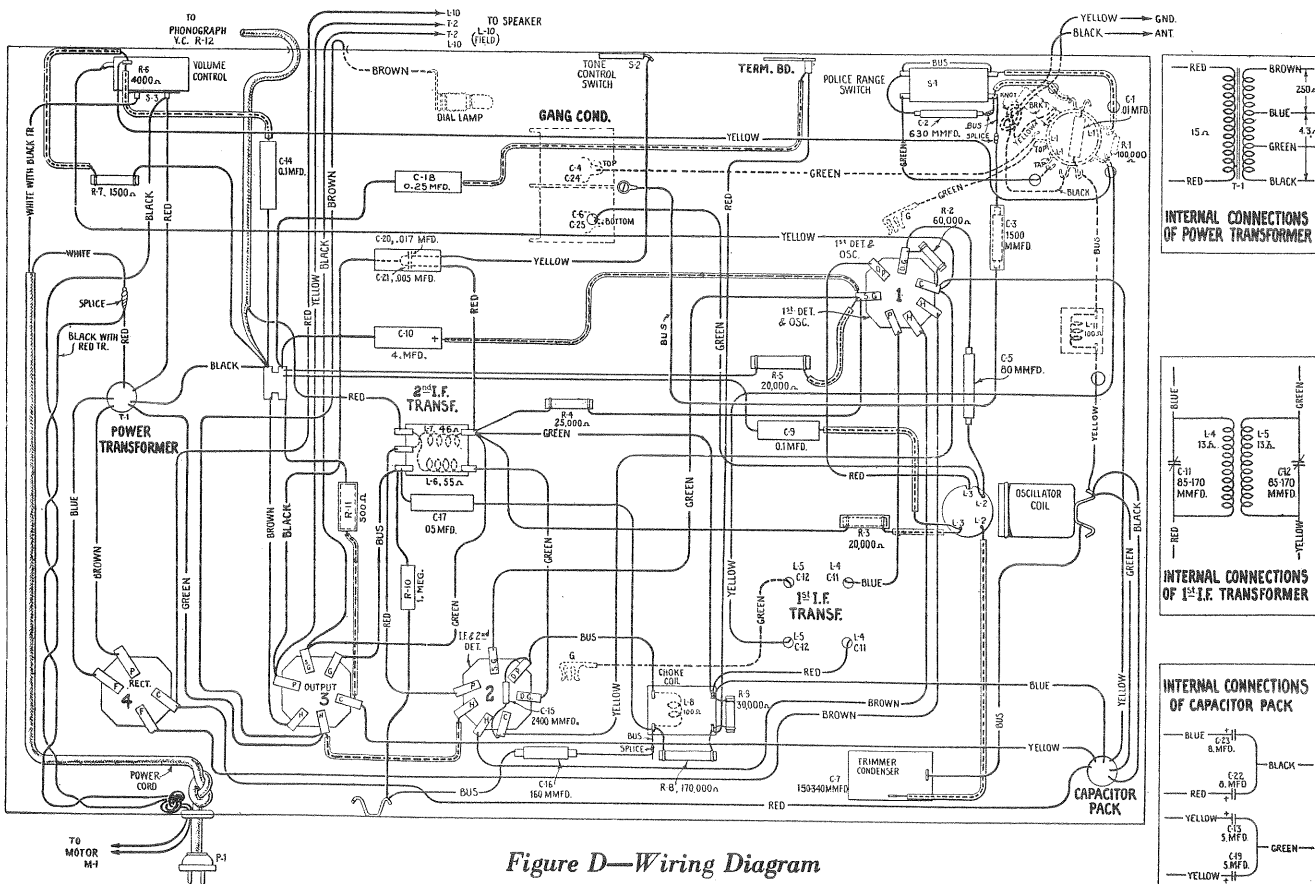


Figure D—Wiring Diagram

PHONOGRAPH MOTOR SERVICE DATA

The synchronous motor used in this instrument is of simple design and foolproof construction. Among its many features are low power consumption, single moving part, ease of starting, oilless main bearing, resilient bumper, and long life with freedom from service repairs.

Figure E shows the main parts of the motor and the points that may require attention.

Operation—The two stator coils are connected in series and the motor is started by giving it a clockwise spin with the hand. If it is found to be difficult of starting, or if it runs at a sub-synchronous speed such as at 70 R. P. M., such action may result from one of the following causes:

Difficult to Start—This may be due to the stator failing to rotate on the outer bearing. This can be caused by the spaghetti sleeve being jammed in the slot, or sticking to the resilient bumper. The outer bearing not being properly lubricated may also cause this condition. It is important that the ball bearing be at the bottom of the main bearing assembly.

Slow Speed—If the turntable is jarred or slowed down, the motor may run at a sub-synchronous speed, such as 70 R. P. M. This is remedied by merely lifting the tone arm from the turntable, thereby removing the load. The turntable speed will then immediately increase to normal.

Excessive Vibration and Hum—A small amount of hum when starting decreasing to a

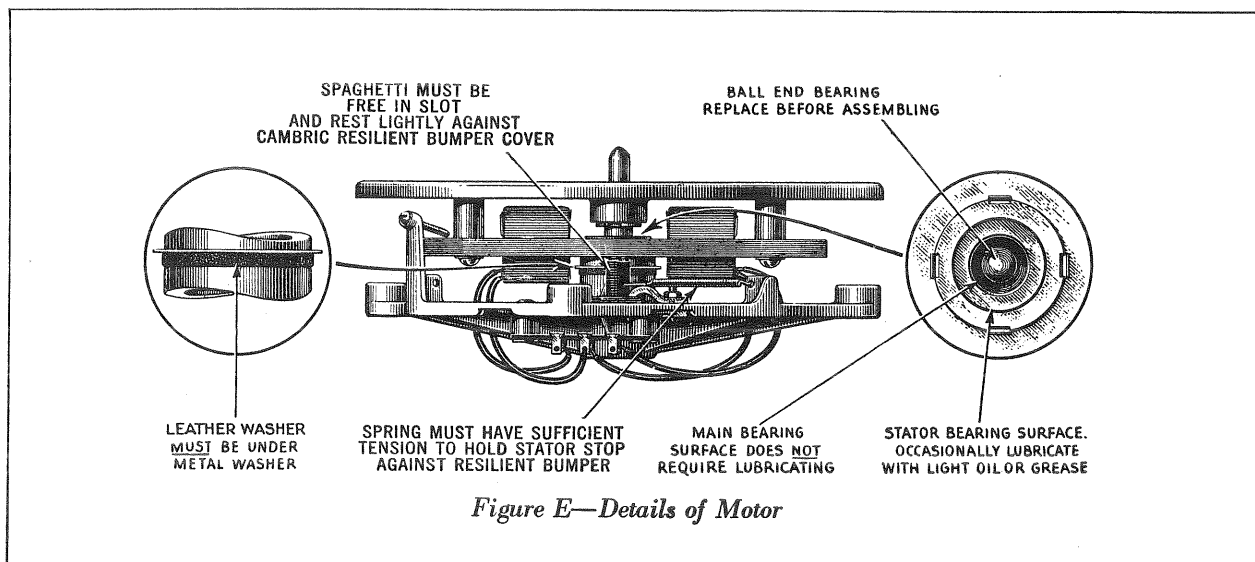
negligible amount while running is normal. If excessive vibration occurs either at starting or running, it may be due to one of the following:

- (1) Insufficient lubricant in outer bearing or any other failure that will cause the stator to bind.
- (2) The metal washer should be above the leather washer at the bottom of the main bearing.
- (3) Motor not properly supported from motor board. Unless the motor is properly supported from the motor board, normal vibration will be excessive.

Removing Rotor from Stator—The rotor which includes the turntable may be removed by loosening the screw shown in Figure E until it clears the rotor and then lifting the turntable. Be careful not to lose the ball end-bearing when this is removed. After replacing the rotor, tighten the restraining screw securely to eliminate the possibility of rattle in operation.

Power Consumption—The motor consumes 4 watts. It should never be turned on when the rotor is removed, as in this condition excessive current will be drawn with consequent increase in temperature.

NOTE: The above values of power consumption are average for a 60 cycle motor at 125 volts. At lower voltages the power consumption will be less.



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	Contact cap—Package of 5	\$0.50	6669	Switch—Tone control switch (S2)	\$0.50
3047	Resistor—1500 ohms—Carbon type—½ watt (R7)— Package of 5	1.00	6832	Capacitor—4.0 mfd. (C10)	.85
3076	Resistor—1 megohm—Carbon type—½ watt (R10)— Package of 5	1.00	9464	Transformer—Power transformer—105-125 volts—50-60 cycles (T1)	3.20
3118	Resistor—100,000 ohms—Carbon type—½ watt (R1)— Package of 5	1.00	9465	Transformer—Power transformer—105-125 volts—25-40 cycles	4.38
3077	Resistor—30,000 ohms—Carbon type—½ watt (R9)— Package of 5	1.00	REPRODUCER ASSEMBLIES		
3459	Capacitor—80 mmfd. (C5)	.44	6788	Transformer—Output transformer (T2)	1.60
3597	Capacitor—0.25 mfd. (C18)	.40	8987	Cone—Reproducer cone complete (L9)—Package of 5	5.00
3572	Socket—7-contact Radiotron socket	.38	9437	Coil assembly—Comprising field coil, magnet and cone support (L10)	2.72
3584	Ring—Oscillator coil retaining ring—Package of 5	.40	9467	Reproducer complete	5.15
3602	Resistor—60,000 ohms—Carbon type—¼ watt (R2)— Package of 5	1.00	TURNTABLE AND MOTOR ASSEMBLIES		
3603	Resistor—500 ohms—Carbon type—1 watt (R11)— Package of 5	1.10	3808	Board—Motor terminal board	.20
3641	Capacitor—0.1 mfd. (C9)	.35	4052	Spring—Package of 5	.40
3682	Shield—Radiotron shield	.22	3813	Motor suspension assembly—Comprising one screw, one metal bushing, two rubber bushings, one flat washer, one lockwasher and one nut—3 sets	.56
3701	Capacitor—0.01 mfd. (C1)	.30	4083	Washer—Leather washer—Package of 10	.20
3713	Capacitor—0.05 mfd. (C17)	.32	4084	Washer—Metal washer—Package of 10	.26
3857	Coil—Detector choke coil (L8)	.90	7651	Coil—Stator coil—60 cycle operation	.48
3858	Socket—Dial lamp socket and bracket	.26	7652	Coil—Stator coil—50 cycle operation	.48
3859	Socket—4-contact Radiotron socket	.30	7653	Lamination—Stator laminations—Assembled—60 cycle operation—110 or 220 volts	.66
3862	Screw—Chassis mounting screw and washer—Package of 4	.24	7654	Lamination—Stator laminations—Assembled—50 cycle operation	.66
3865	Capacitor—160 mmfd. (C16)	.30	7655	Lamination—Rotor lamination assembly—60 cycle opera- tion	1.00
3869	Resistor—170,000 ohms—Carbon type—½ watt (R8)— Package of 5	1.00	7656	Lamination—Rotor lamination assembly—50 cycle opera- tion	1.00
3873	Capacitor—1500 mmfd. (C3)	.30	7657	Base—Motor base and bearing assembly	1.20
3877	Capacitor—0.1 mfd. (C14)	.32	7714	Lamination—Rotor laminations—Assembled—60 cycles— 220 volts	1.76
3886	Reflector—Dial light reflector	.30	7715	Coil—Stator coil—60 cycles—220 volts	.68
3887	Scale—Dial scale—Package of 5	.60	9038	Motor complete—105-125 volts—60 cycles	8.00
3889	Resistor—25,000 ohms—Carbon type—3 watt (R4)	.25	9039	Motor complete—105-125 volts—50 cycles	8.00
3917	Capacitor—0.25 mfd. (C18)	.40	9040	Turntable complete—With spindle for 50 or 60 cycle operation	1.16
3932	Capacitor—2400 mmfd. (C15)	.30	10194	Ball—Steel ball bearing—Package of 20	.25
3933	Capacitor—630 mmfd. (C2)	.32	PICKUP AND ARM ASSEMBLIES		
4000	Capacitor—Adjustable capacitor (C7)	.78	3811	Screw—Needle holding screw—Package of 10	.46
4018	Coil—Choke coil (L11)	.90	3812	Armature	.32
6676	Socket—6-contact socket	.40	6825	Pickup and arm assembly complete	4.82
6787	Capacitor—Comprising one .005 mfd. and one .017 mfd. capacitors (C20, C21)	.30	6826	Coil—Pickup coil (L12)	.64
6114	Resistor—20,000 ohms—Carbon type—1 watt (R3, R5)— Package of 5	1.10	MISCELLANEOUS PARTS		
6660	Condenser—2-gang variable condenser (C4, C6, C24, C25)	2.78	3961	Knob—Phonograph volume control knob—Package of 5	.60
6661	Capacitor pack—Comprising two 5.0 mfd. and two 8.0 mfd. capacitors (C13, C19, C22, C23)	2.70	4087	Screw and washer—Chassis mounting screw and washer assembly—Package of 4	.22
6662	Transformer—First intermediate frequency transformer (L4, L5, C11, C12)	2.34	4199	Knob—Station selector knob—Package of 5	.80
6663	Transformer—Second intermediate frequency transformer (L6, L7)	1.06	4200	Knob—Range switch, volume or tone control knob—Pack- age of 5	1.05
6664	Coil—Oscillator coil (L2, L3)	.94	6827	Volume control—Phonograph volume control (R12)	1.46
6665	Shield—Oscillator coil shield and mounting bracket	.34	6828	Transformer—Phonograph input transformer (T3)	2.60
6666	Coil—Antenna coil (L1, C1, R1)	1.08			
6667	Volume control (R6, S3)	1.58			
6668	Switch—Range switch (S1)	.58			