RCA VICTOR MODEL D8-28

Eight-Tube, Three-Band, A-C, Radio-Phonograph

TECHNICAL INFORMATION

Electrical Specifications

FREQUENCY RANGES

Band A	540- 1,625 kc.
Band B	1,625- 5,700 kc.
Band C	5,700-18,000 kc.

ALIGNMENT FREQUENCIES

Band A	600 kc. (osc.), 1,400 kc. (osc., det., ant.)
Band B	None required
Band C	18,000 kc. (osc., det., ant.)

Intermediate Frequency ..... **460 kc**

RADIOTRON COMPLEMENT

(1) RCA-6K7	Radio-Frequency Amplifier
(2) RCA-6A8	First Detector-Oscillator
(3) RCA-6K7	Intermediate Amplifier
(4) RCA-6H6	Second Detector-A.V.C.
(5) RCA-6F5	Audio Voltage Amplifier
(6) RCA-6F6	Audio Power Amplifier
(7) RCA-5Z4	Full-Wave Rectifier
(8) RCA-6E5	Tuning Indicator

POWER SUPPLY RATINGS

Rating A	105-125 Volts, 50-60 Cycles, 135 Watts
Rating B	105-125 Volts, 25 Cycles, 135 Watts
Rating C	105-130/140-160/200-250 Volts, 50-60 Cycles, 135 Watts

LOUDSPEAKER

Type	12-inch Electrodynamic
Voice Coil Impedance	2¼ Ohms at 400 Cycles

POWER OUTPUT RATINGS

Undistorted	2¼ Watts
Maximum	5 Watts

PHONOGRAPH

Type	Manual
Turntable Speed	78 R.P.M.
Type of Pickup	Improved Low-Impedance Magnetic
Pickup Impedance	7 Ohms at 1,000 Cycles

Mechanical Specifications

Height	42⅛ inches
Width	22⅞ inches
Depth	14⅞ inches
Weight (Net)	82 pounds
Weight (Shipping)	144 pounds
Chassis Base Dimensions	13⅞ inches x 7⅝ inches x 2½ inches

General Description

The RCA Victor Model D8-28 combination instrument consists of an eight tube radio receiver and a manually operated phonograph combined in the one cabinet. An improved 12-inch dynamic loudspeaker provides excellent reproduction and readily handles the high level of sound energy obtainable from the output of this instrument.

Magic Brain

The radio receiver incorporates the Junior "Magic Brain" which is a scientifically correct co-ordination of all the parts of the r-f, oscillator, and first detector functions of a Superheterodyne Receiver. This arrangement provides greater efficiency, especially in

the short-wave ranges, as all lead lengths are kept as short as possible and all sockets and other parts are located for best possible operation.

Magic Eye

A cathode-ray tube whose fluorescent screen has the appearance of a human eye, is used for visually indicating when the receiver is accurately tuned to the incoming signal. This tube is of new design. It contains two groups of elements; one group operates as an amplifier and the other group operates as a cathode-ray tube.

The cathode-ray section consists of a conically shaped luminescent screen, a cathode, and a control electrode. The detected signal from the receiver is applied through the amplifier section of the tuning tube to the control electrode of the cathode-ray section. This control electrode, in turn, affects the electron stream emitted by the cathode in such a manner as to cause a triangular shadow on the luminescent screen. The size of the shadow caused by the control electrode is determined by the strength of the incoming signal, so that a change-of-tuning is readily exhibited on the cathode-ray screen, and therefore, tuning to exact resonance can be definitely obtained.

RCA All-Metal Tubes

The new metal tubes are used in the radio receiver for amplifying and detecting purposes. These tubes make possible a greater range of stable amplification not previously attainable with corresponding glass types. Their metal envelopes form a perfect electrostatic and electromagnetic shield, precluding the former necessity for elaborate shielding by means of cans. The metal tubes are especially adaptable to the modern, extended-range receivers because of their efficient shielding and their favorable internal characteristics.

Phonograph Mechanism

An improved manually operated phonograph mechanism is used in this model. The 12-inch turntable will accommodate either the 10-inch or the 12-inch phonograph records. The turntable rotates at a speed of 78 r.p.m. A speed regulator is provided for accurate adjustment of this speed. The instrument may be purchased with any one of three ratings as specified under Electrical Specifications. *It is important that a machine of any particular rating be operated at the frequency and voltage for which it is rated.* Attempts to operate at ratings other than specified for the particular instrument may result in damage to both the phonograph motor and the radio receiver. An automatic switch is provided to turn "off" the phonograph motor at the completion of record play when the eccentric-type inside groove record is used.

Tuning Dial

The tuning dial is an illuminated semi-airplane type. Each band is distinctively marked with a separate color for each band. Positions of the range selector knob are plainly marked on the control panel with letters indicating each band position placed over color strips corresponding to the band colors on the dial. The tuning control is of the dual-ratio type which permits fast tuning through a 10-to-1 drive ratio and vernier tuning through a 50-to-1 drive ratio. The latter is especially advantageous for accurate tuning of the short-wave stations. The new shock-proof condenser mounting reduces microphonic tendencies to a minimum.

Circuit Arrangement

The conventional Superheterodyne type of circuit, consisting of an r-f stage, a combined first-detector–oscillator stage, a single i-f stage, a diode-detector –automatic-volume-control stage, an audio voltage amplifier stage, an audio power output stage and a high-voltage rectifier power-supply stage, is used.

Tuned Circuits

The antenna coil system and the detector coil system each consist of a single primary and three series-connected secondary windings to provide the three ranges of tuning. The oscillator coil system is similarly wound on a single form. A range selector switch (S-1) is used for connecting the various sections of these three coil systems into the circuit to provide operation on the band desired. The coils are tuned by a variable three-section gang condenser having trimmer capacitors in shunt with each section. There are additional trimmer capacitors across the section of each coil used for Band "A." A series trimmer is also associated with the Band "A" oscillator coil.

The intermediate frequency amplifier system consists of an RCA-6K7 in a transformer-coupled circuit. This stage operates at a basic frequency of 460 kc. Each winding of both i-f transformers (input and output) is tuned by an adjustable trimmer.

Detector and A.V.C.

The modulated signal as obtained from the output of the i-f stage is detected by an RCA-6H6 twin-diode tube. The audio frequency secured by this process is transferred to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage, which develops across resistor R-8, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes through a suitable resistance filter circuit. The second (auxiliary) diode of the RCA-6H6 is used to supply residual bias for the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R-8 and R-9, thereby maintaining the desired minimum operating bias on such tubes. On application of signal energy above a certain level, however, the auxiliary bias-diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual volume control consists of an acoustically tapered potentiometer in the audio circuit between the output of the detector diode and the input grid of the audio-voltage-amplifier tube. This control

has a tone compensating filter connected to it so that the correct aural balance will be obtained at different volume settings.

Resistance-capacitance coupling is used between the first audio stage and the power output stage. The output of the power amplifier is transformer-coupled into the dynamic loudspeaker. High-frequency tone control is effected by a capacitor across the plate circuit of the output tube. Speech-music control is effected by a resistor connected to the compensated volume control circuit. Control of tone is obtained by means of the switch (S-2).

Rectifier

The power required for operation of this receiver is supplied through transformer T-1. This transformer has an efficient electrostatic shield between its primary and secondary windings. This shield prevents interference which is on the power-supply circuit from entering the receiver and conversely reduces the tendency of the receiver to re-radiate into the power circuit. An RCA-5Z4 furnishes the d-c voltages necessary for plate, screen, cathode, and grid potentials. The field winding of the loudspeaker is used as a reactor in the filter circuit from which it simultaneously receives its magnetizing current. The heaters of all Radiotrons are supplied from a low voltage (6.3 volt) winding on the power transformer. One side of this winding is at ground potential.

SERVICE DATA

The various diagrams of this bulletin contain such information as will be needed to isolate causes for defective operation when such a condition develops. Values of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles, such as R-3, L-2, C-1, etc., are provided for reference between the diagrams and the replacement parts list. Locating of the parts in the schematic circuit is facilitated by the fact that the numerical titles increase from left to right on the diagram. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Resistances of less than one ohm are generally omitted.

Alignment Procedure

Precise alignment is vital to the proper functioning of this receiver. There are four trimming adjustments provided in the i-f system, three in the oscillator coil system, two in the detector coil system, and two in the antenna coil system. Each of these trimmers has been accurately adjusted during manufacture and should remain properly aligned unless affected by abnormal conditions of climate or have been altered for service purposes. Incorrect alignment is usually evidenced by loss of sensitivity, improper tone quality, and poor selectivity. These indications will generally be present together.

The correct performance of the receiver can only be obtained when the alignment is performed with adequate and reliable test apparatus. The manufacturer of this instrument has a complete assortment of such service equipment available. This equipment, illustrated and described on a separate page of this booklet, may be purchased from authorized distributors and dealers.

An oscillator (signal generator) is required as a source of the specified alignment frequencies. Visual indication of the receiver output during the adjustments is necessary to enable the serviceman to obtain an accuracy of alignment which is not possible by listening to the signal. **The RCA Victor Stock No. 9595 Full-Range Oscillator and the RCA Victor Stock No. 4317 Neon Output Indicator are especially suitable and fulfill the above requirements.**

The following procedure should be followed in adjusting the various trimmer capacitors:

I-F Trimmer Adjustments

The four trimmers of the two i-f transformers are located as shown by Figure 6. Each must be aligned to a basic frequency of **460 kc.** To do this, attach the Output Indicator across the voice coil circuit or across the output transformer primary. Connect the output of the test oscillator between the control-grid of the RCA-6A8 first detector tube and chassis-ground. Tune the oscillator to **460 kc.** Advance the receiver volume control to its full-on position and adjust the receiver tuning control to a point within its range where no interference is encountered either from local broadcast stations or the heterodyne oscillator. Increase the output of the test oscillator until a slight indication is apparent on the output indicator. Then adjust the two trimmers, **C-25** and **C-26,** of the second i-f transformer to produce maximum (peak)

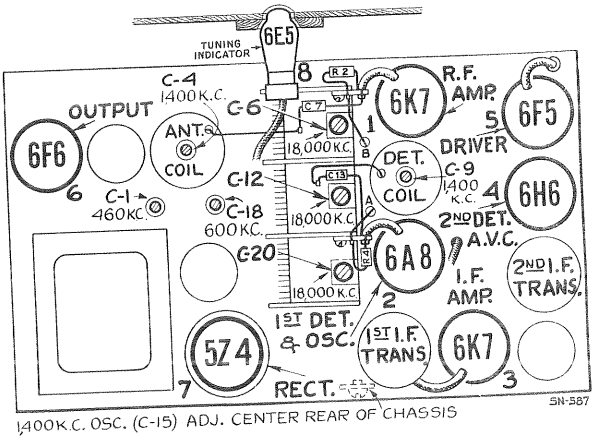


Figure 1—Radiotron and Coil Locations

indicated receiver output. Then, adjust the two trimmers, **C-23** and **C-24,** of the first i-f transformer for maximum (peak) receiver output as shown by the indicating device. During these adjustments, regulate the test oscillator output so that the indication is always as low as possible. By doing so, broadness of tuning due to a.v.c. action will be avoided. It is advisable to repeat the adjustment of all i-f trimmers a second time to assure that the inter-action between them has not disturbed the original adjustment.

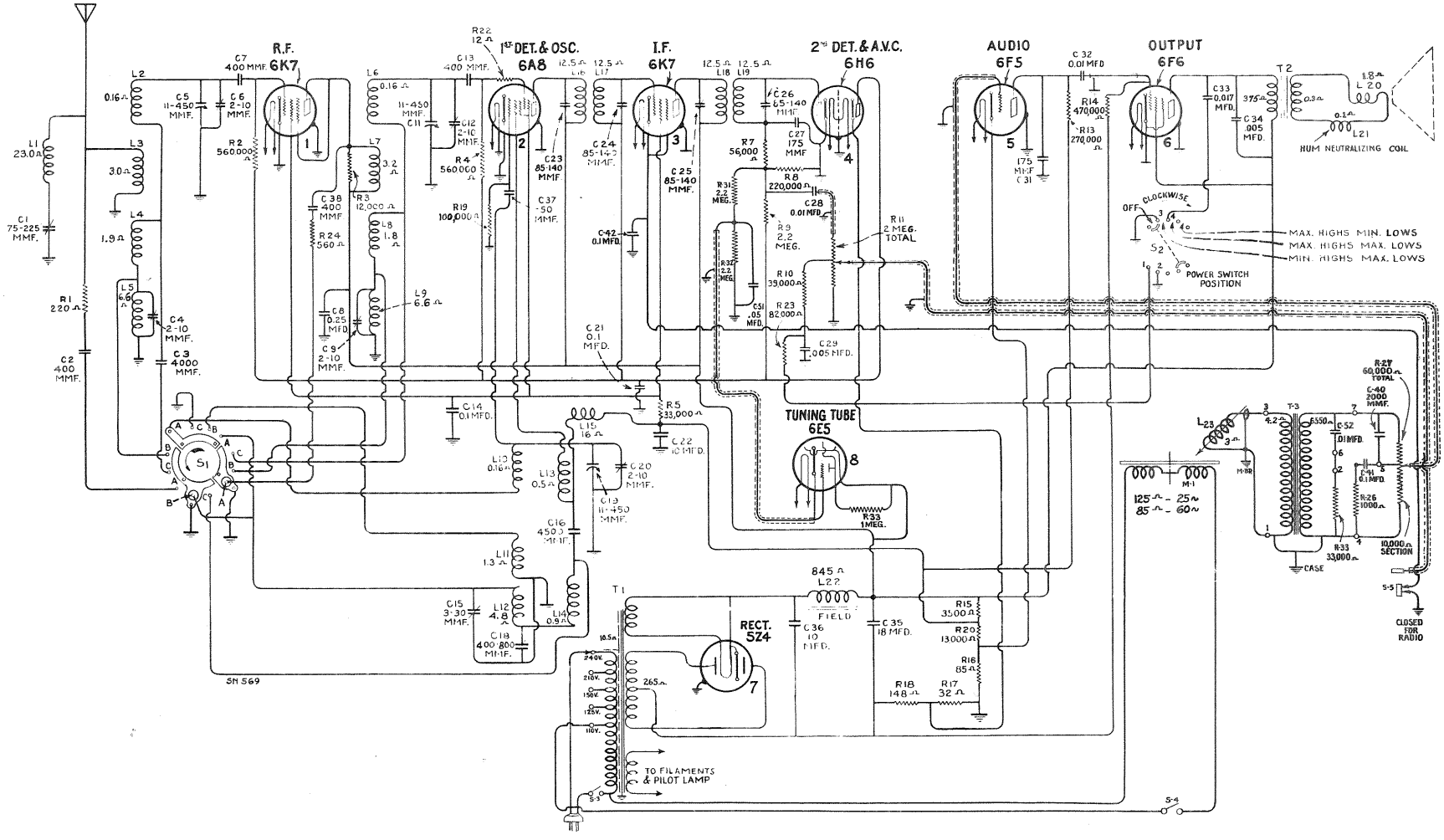


Figure 2—Schematic Circuit Diagram

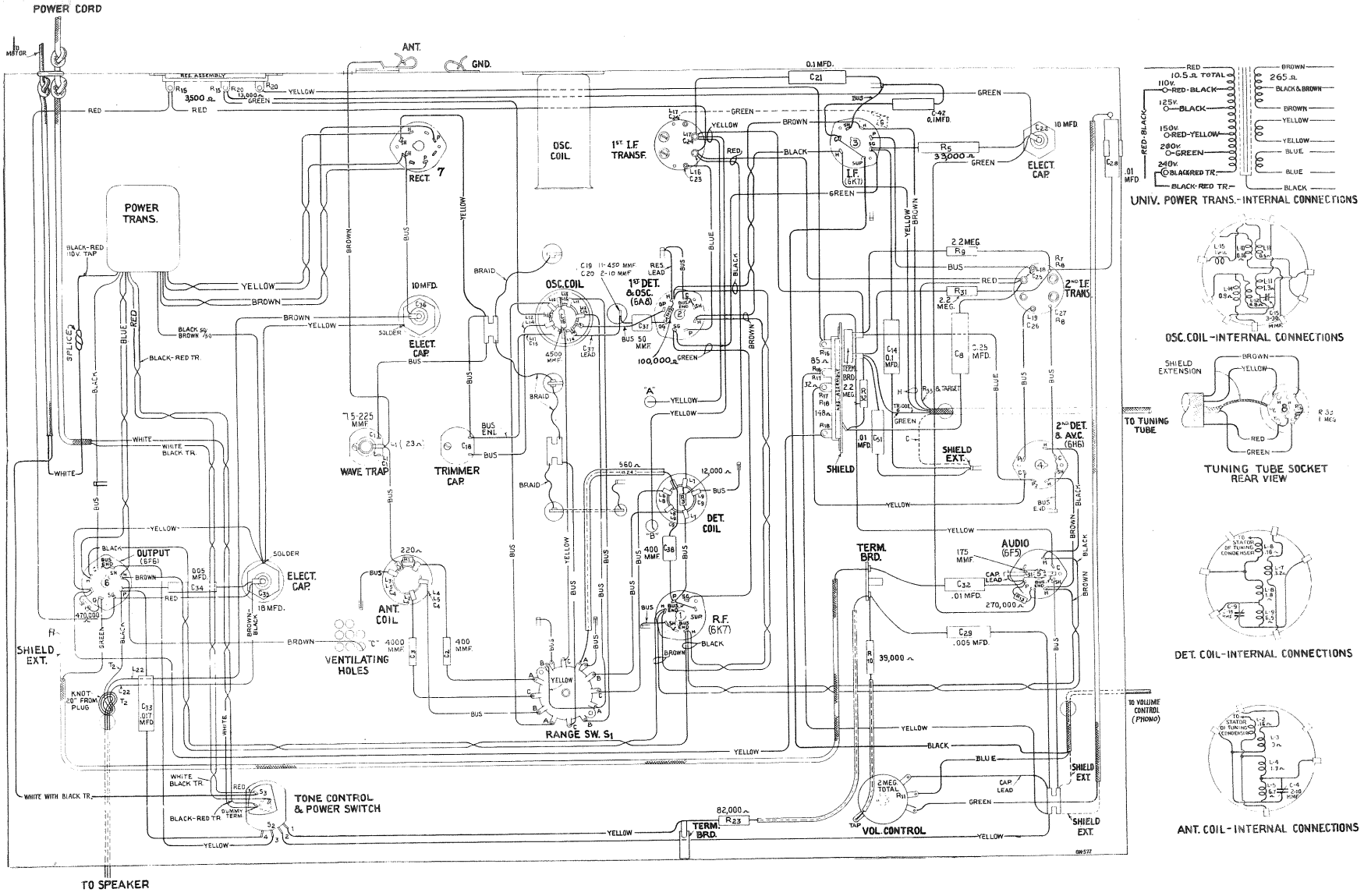


Figure 3—Chassis Wiring Diagram

R-F Trimmer Adjustments

The seven trimmers associated with the r-f, first detector, and oscillator tuned circuits have their locations shown by Figure 1. The three trimmers which are at all times directly in shunt with the variable tuning condenser necessitate that the high-frequency range (Band C) be aligned first. The range selector switch should, therefore, be turned to its Band C position for the first adjustment. The Output Indicator should be left connected to the output system. Attach the output terminals of the test oscillator to the antenna and ground terminals of the receiver.

Calibrate the dial by rotating the tuning control until the variable condenser plates are in their full mesh (maximum capacity) position and adjusting the dial pointer so that its end points to the ***horizontal*** graduation (530 kc.) at the low frequency end of the Band A scale.

Proceed further as follows:

(a) Adjust the test oscillator to **18,000 kc.** and set the receiver tuning control to a dial reading of **18,000 kc.**

(b) Regulate the output of the test oscillator until a slight indication is perceptible at the receiver output. Then adjust the trimmer, **C-20,** on the

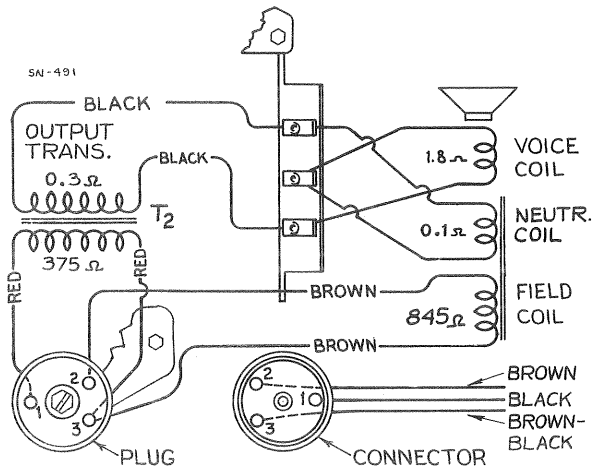


Figure 4—Loudspeaker Wiring

oscillator section of the variable condenser to the point at which it produces maximum indicated receiver output. Two points may be found, each of which produces such a maximum. The one of ***maximum trimmer capacitance*** is correct and should be used. (The oscillator will be **460 kc.** below the signal frequency at this adjustment point.)

(c) Adjust the trimmer, **C-12,** of the detector section of the variable condenser, simultaneously rocking the receiver tuning control backward and forward through the **18,000 kc.** input signal, until maximum receiver output results from these combined operations. Rocking of the variable condenser will prevent inaccurate adjustment which would otherwise be caused by the inter-action between the heterodyne oscillator circuit and the detector tuned circuit.

(d) With the receiver tuning control set to **18,000 kc.** adjust the trimmer, **C-6,** on the antenna section of the variable condenser to the point which produces maximum (peak) indicated receiver output.

(e) Change the receiver range selector to its Band A position and set the receiver tuning control to a dial reading of **1,400 kc.** Tune the test oscillator to **1,400 kc.** and regulate its output to produce a slight indication on the receiver output indicating device.

(f) Adjust the high frequency trimmers of the Band A oscillator, detector, and antenna coils, **C-15, C-9,** and **C-4** respectively, to the points at which each produces maximum indicated receiver output.

(g) Shift the test oscillator frequency to **600 kc.** and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received.

(h) Tune the low frequency trimmer, **C-18,** of the oscillator Band A coil, simultaneously rocking the tuning control of the receiver backward and forward through the signal, until maximum indicated receiver output results from these combined operations. The adjustment of **C-20, C-12,** and **C-6** should be corrected at **18,000 kc.** as in (b), (c), and (d); also **C-15, C-9,** and **C-4** should be corrected at **1,400 kc.** as in (f) to compensate for any changes caused by the adjustment of the low frequency oscillator coil trimmer.

Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to chassis on Figure 6 will assist in the location of causes for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated supply voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. The voltages given are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance becomes comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1000 ohms per volt will be satisfactory when the range used for each reading is chosen as high as possible consistent with good readability.

Standard Transformer

The transformer used on some models of this instrument is adaptable for voltages and frequencies as given under Ratings A and B of Electrical Specifications. Its schematic and wiring are shown by Figure 5.

Wave-Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc. during manufacture, however, local conditions may require a readjustment, depending upon the interfering frequency.

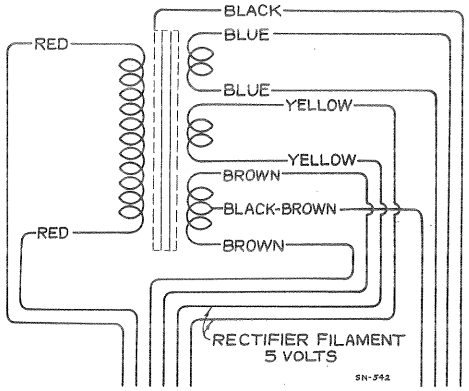
Phonograph Mechanism

The phonograph motor is of the governor induction type and designed to be simple and foolproof. Under normal operating conditions, service difficulties should be negligible. Occasionally, however, certain adjustments may be required. These adjustments are illustrated and explained in Figure 9. Application of oil to the felt pad which rubs against the governor disc will insure smooth operation.

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design, having several variations from the usual type of pickup. The magnetic assembly is one rigid piece. The horseshoe magnet is solidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and provides a damping effect on the movement of the armature. The frequency response is uniform over a wide range.

Service operations which may be necessary on the pickup are as follows:



110 VOLT—60 CYCLE	110 VOLT—25 CYCLE
Pri. Res. 5.34 ohms, total	Pri. Res. 7.37 ohms, total
Sec. Res. 330 ohms, total	Sec. Res. 430 ohms, total

Figure 5—Standard Power Transformer Connections

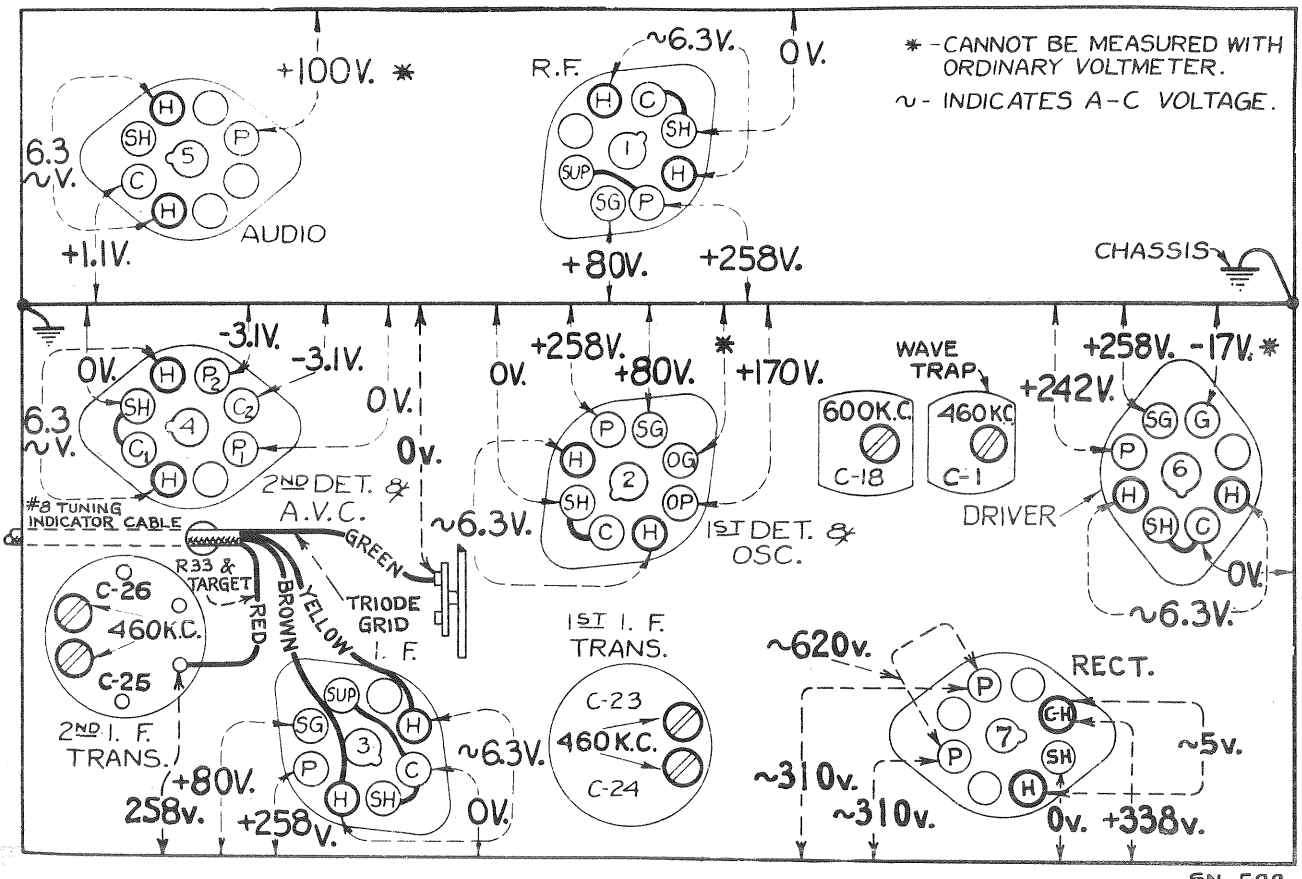


Figure 6—Radiotron Socket Voltages

Measured at 115 volts, 60 cycles—No signal input

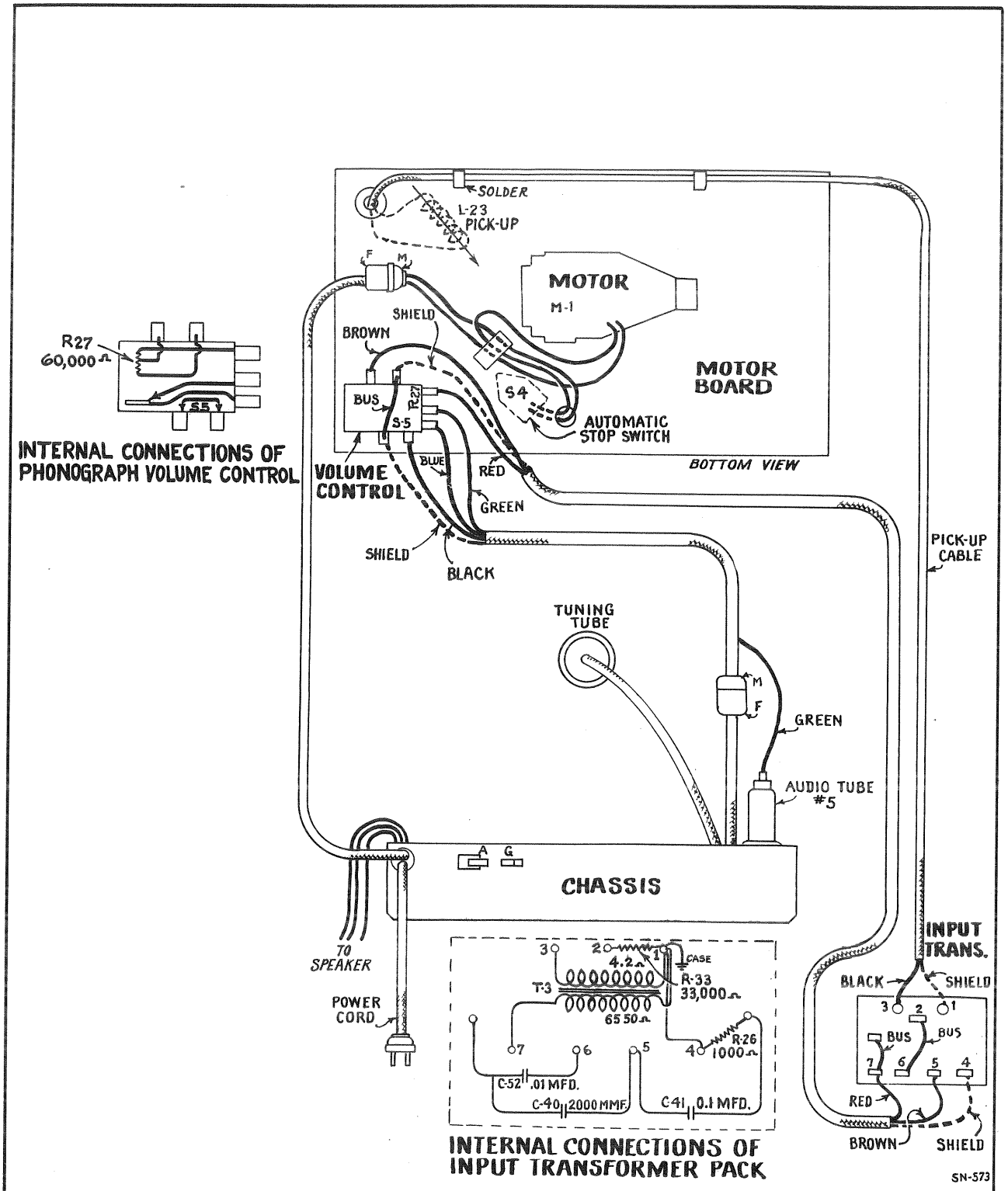


Figure 7—Assembly Wiring

Centering Armature

Refer to Figure 8 showing the pickup inner structure. The armature is shown in its proper relation to the magnet pole pieces, i. e., exactly centered. Whenever this centering adjustment has been disturbed, the screws A, B, and C should be loosened

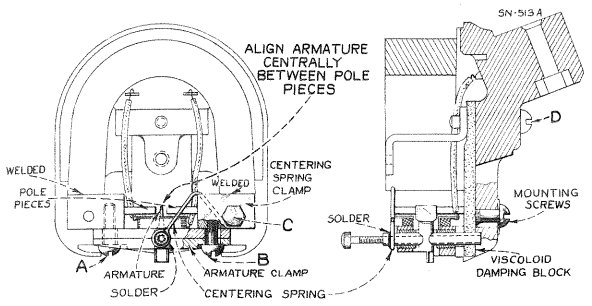


Figure 8—Details of Pickup

and the armature clamp adjusted to the point where the vertical axis of the armature is at right angles to the horizontal axis of the pole pieces, and centered between them. This centering operation may be facilitated by inserting a small rod or nail into the armature needle hole, using it as a lever to test the angular movement of the armature. The limitations of the movement in each direction will be caused by the armature striking the pole pieces. The proper adjustment is obtained when there is equal angular displacement of the armature and adjustment rod or nail to each side of the vertical axis of the magnet and coil assembly. The screws A and B should then be secured, observing care not to disturb the adjustment of the armature clamp. Then place the pickup in a vise and secure the centering spring-clamp by means of the screw C, allowing the centering spring to remain in the position at which the armature is exactly centered between the pole pieces. With a little practice, the correct adjustment of the armature may be readily obtained. The air gap between the pole pieces and the armature should be kept free from dust, filings, and other such foreign materials which would obstruct the movement of the pickup armature.

Damping Block

The viscoloid block which is attached to the back end of the armature shank serves as a mechanical filter to eliminate undesirable resonances and to cause the frequency response to be uniform. Should it be necessary to replace this damping block, it may be done by removing screw D and the cover support bracket from the mechanism and taking off the old viscoloid block. The surface of the armature which is in contact with the viscoloid should be thoroughly cleaned with fine emery cloth. Then insert the new block so that it occupies the same position as it did originally. Make certain that the block is in correct vertical alignment with the armature. The hole in the new viscoloid block is somewhat smaller than the diameter of the armature in order to permit a snug fit. With the viscoloid aligned on the armature, screw

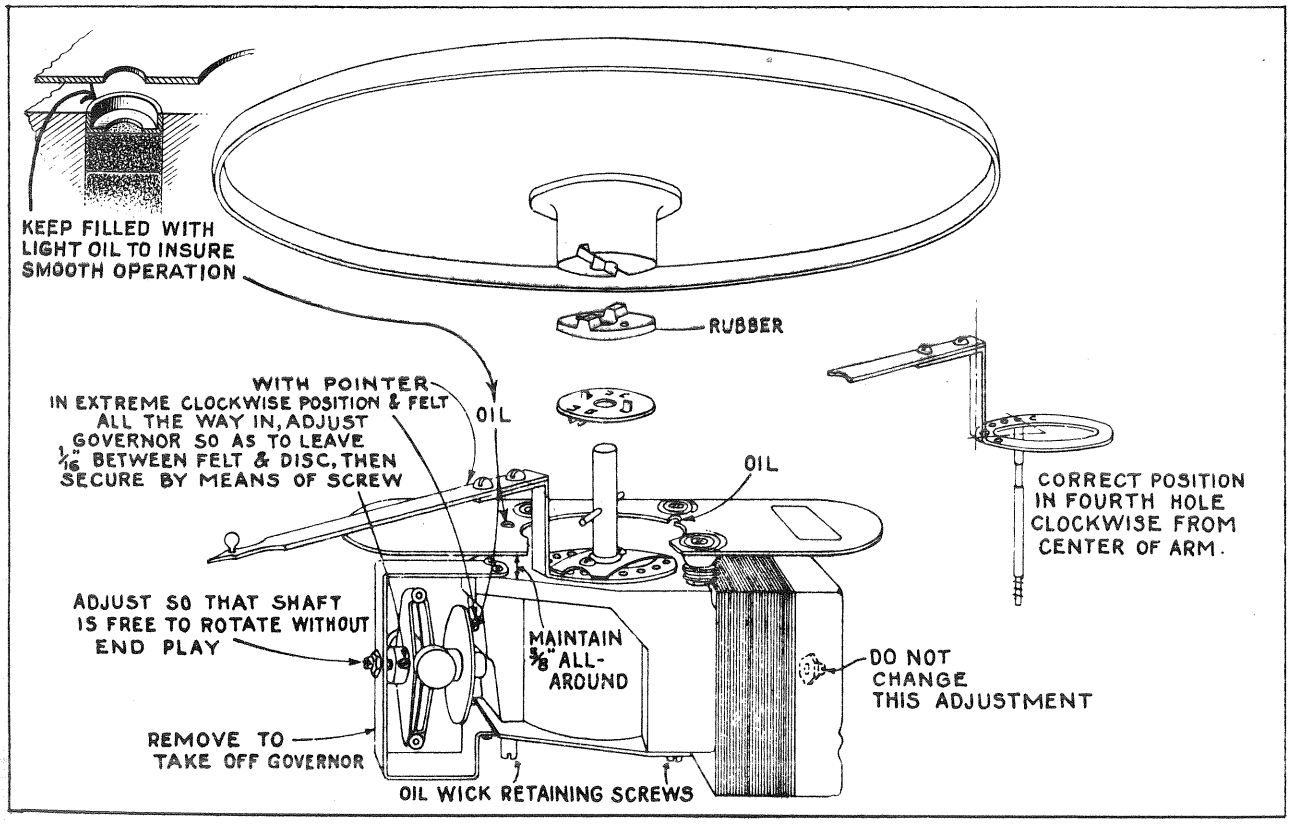


Figure 9—Motor Details SN-586

D and the cover support bracket should then be replaced. Heat should be applied to the armature (viscoloid side) so that the viscoloid block will fuse at the point of contact and become rigidly attached to the armature. A special-tip soldering iron constructed as shown in Figure 10 will be found very useful in performing this operation. The iron should be applied only long enough to slightly melt the block and cause a small bulge on both sides.

Replacing Coil

Whenever there is defective operation due to an open or shorted pickup coil, this coil should be replaced. The method of replacement will be obvious upon inspection of the pickup assembly and by study of the cut-a-way illustrations. Make sure that the new coil is properly centered with the hole in the support strip and glued securely in that position. It is important to readjust the armature as previously explained after re-assembly of the mechanism. Only rosin core solder should be used for soldering the coil leads in the pickup. This same type of solder should be used when necessary for soldering the centering spring to the armature.

Magnetizing

Loss of magnetization will not usually occur when the pickup has received normal care, due to the fact that the magnet and pole pieces are one unit and the magnetic circuit remains closed at all times. When the pickup has been mishandled, subjected to a strong a-c field, jolted, or dropped, there may be an appreciable loss of magnetic strength, in which case it will be necessary to re-magnetize the entire structure. This should be done by first removing the pickup cover and then placing the pickup assembly on the poles of

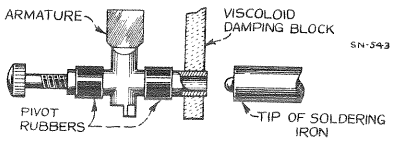


Figure 10—Special Soldering-Iron Tip

a standard pickup magnetizer such as the RCA Pickup Magnetizer, Stock No. 9549, and charging the pickup in accordance with the instructions accompanying the magnetizer. It is recommended that the pickup be magnetized with the armature in place. This will require that one pole piece on the pickup magnetizer be rotated 180 degrees. This gives the desired clearance for the armature clamp assembly. It is preferable to check the polarity of the pickup magnet and to re-magnetize it so that the same polarity is maintained.

REPLACEMENT PARTS

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

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condenser mounting bushing assembly—Package of 3	$0.43
11625	Cable—Radiotron tuning tube cable complete with socket	1.26
11759	Cable—Phonograph input cable complete with 4-contact female connector stock 4153—connects chassis to cable stock 11948	.92
11350	Cap—Contact cap—Package of 5	.20
11465	Capacitor—Adjustable capacitor—(C18)	.48
11289	Capacitor—50 MMfd.—(C37)	.26
5116	Capacitor—175 MMfd.—(C31)	.18
11290	Capacitor—400 MMfd.—(C2, C7, C13, C38)	.25
11401	Capacitor—4000 MMfd.—(C3)	.38
4868	Capacitor—.005 Mfd.—(C29, C34)	.20
4906	Capacitor—.017 Mfd.—(C33)	.25
11395	Capacitor—.01 Mfd.—(C28)	.18
4858	Capacitor—.01 Mfd.—(C32)	.25
4886	Capacitor—.05 Mfd.—(C51)	.20
4839	Capacitor—0.1 Mfd.—(C14)	.28
4841	Capacitor—0.1 Mfd.—(C21)	.22
11414	Capacitor—0.1 Mfd.—(C42)	.20
5170	Capacitor—0.25 Mfd.—(C8)	.25
11240	Capacitor—10 Mfd.—(C36)	1.08
11387	Capacitor—10 Mfd.—(C22)	.86
5212	Capacitor—18 Mfd.—(C35)	1.16
5238	Clip—Antenna terminal board with clip, insulating strip and rivets	.14
11600	Coil—Antenna coil—(L2, L3, L4, L5, C4, R1)	1.78
11601	Coil—Detector coil—(L6, L7, L8, L9, C9, R3)	1.78
11602	Coil—Oscillator coil—(L10, L11, L12, L13, L14, L15, C15, C16)	2.15
11385	Condenser—Three-gang variable tuning condenser—(C5, C6, C11, C12, C19, C20)	5.02
4153	Connector—4-contact female connector for cable stock 11759	.48
11892	Dial—Station selector dial scale	.78
11613	**Drive—Variable tuning condenser drive**	1.00
11394	Foot—Chassis foot assembly — Package of 2	.70
11893	Indicator — Station selector indicator pointer	.28
5226	Lamp—Dial lamp—Package of 5	.70
11393	Resistor—Voltage divider resistor—comprising one 3,500 ohm and one 13,000 ohm sections—(R15, R20)	.74
11329	Resistor—Voltage divider resistor—comprising one 148 ohm, one 32 ohm and one 85 ohm sections—(R16, R17, R18)	.52
11369	Resistor—12 ohms—Flexible type complete with contact cap—(R22)	.22
11324	Resistor—560 ohms—Carbon type—¼ watt—(R24)—Package of 5	1.00
8073	Resistor—33,000 ohms—Carbon type—½ watt—(R5)—Package of 5	1.00
11322	Resistor—39,000 ohms—Carbon type—¼ watt—(R10)—Package of 5	1.00
11365	Resistor—82,000 ohms—Carbon type—¼ watt—(R23)—Package of 5	1.00
3118	Resistor—100,000 ohms—Carbon type—¼ watt—(R19)—Package of 5	1.00

The prices quoted above are subject to change without notice.

REPLACEMENT PARTS—Continued

Stock No.	Description	List Price
11323	Resistor—270,000 ohms—Carbon type—1/4 watt—(R13)—Package of 5	1.00
11172	Resistor—470,000 ohms—Carbon type—1/4 watt—(R14)—Package of 5	1.00
11397	Resistor—560,000 ohms—Carbon type—1/10 watt—(R2, R4)—Package of 5	.75
11626	Resistor—2.2 megohms—Carbon type—1/4 watt—(R9, R31, R32)—Package of 5	1.00
11603	Shield—Antenna or detector coil shield	.26
11604	Shield—Oscillator coil shield	.24
11390	Shield—Intermediate frequency transformer shield	.25
11199	Socket—Dial lamp socket	.14
11195	Socket—5-contact rectifier Radiotron socket	.15
11198	Socket—7-contact 6K7—6F5—or 6H6 Radiotron socket	.15
11196	Socket—8-contact 6A8 or 6F6 Radiotron socket	.15
11386	Switch—Range switch—(S1)	1.16
11392	Switch—Tone control and power switch assembly—(S2, S3)	1.14
11388	Transformer—First intermediate frequency transformer—(L16, L17, C23, C24)	1.90
11389	Transformer—Second intermediate frequency transformer—(L18, L19, C25, C26, C27, R7, R8)	3.02
11803	Transformer—Power transformer—105-125 volts—50-60 cycles	4.38
11804	Transformer—Power transformer—105-125 volts—25-50 cycles	6.02
11805	Transformer—Power transformer—105-130, 140-160, 195-250, volts—40-60 cycles—(T1)	7.95
11391	Trap—Wave trap—(L1, C1)	1.22
11237	Volume control—(R11)	1.20
	MOTOR ASSEMBLIES	
11703	Governor—Governor complete for phonograph motor—Stock No. 11701 or No. 11702	3.05
11701	Motor—Phonograph turntable motor—110 volts—50 to 60 cycles—(M1)	21.20
11702	Motor—Phonograph turntable motor—110 volts—25 cycles	33.35
	MOTOR BOARD ASSEMBLIES	
4594	Box—Used needle box (cup)	.30
7084	Cover—Turntable cover	.40
11704	Damper—Turntable rubber damper and damper plate	.24
4596	Escutcheon—Speed regulator escutcheon plate	.36
4597	Screw—Motor mounting screw assembly—comprising four screws, four lockwashers, four spacers, and four nuts	.22
11696	Turntable—Complete	2.48
11695	Volume Control—Phonograph volume control—(R27, S5)	1.60
	ECCENTRIC AUTOMATIC BRAKE SWITCH ASSEMBLIES	
3994	Cover—Eccentric automatic switch cover and screw	.26
10174	Springs—Automatic brake springs—comprising one each of four springs—Package of 2	.50
6896	Switch—Eccentric automatic brake and switch assembly—less switch cover	2.50
3322	Switch—Eccentric automatic switch only—less cover—(S4)	.75
	PICKUP AND ARM ASSEMBLIES	
11944	Arm—Pickup arm complete—less escutcheon and pickup unit	4.50
11724	Armature—Pickup armature	.38
6346	Back—Pickup housing back	.45
11946	Coil—Pickup coil—(L23)	.65
3521	Cover—Pickup back cover	.18
11708	Cover—Pickup front cover	.15
3737	Damper—Pickup damper—Package of 5	.65
3390	Escutcheon—Pickup arm escutcheon	.46
11945	Pickup Unit—Complete	4.80
3389	Rod—Eccentric automatic brake trip rod—Package of 5	.40
3387	Screw Assembly—Pickup mounting screw assembly—comprising one screw, one lockwasher and one nut—Package of 10	.40
11549	Screw—Pickup front cover screw—Package of 10	.42
11547	Screw—Pickup needle holding screw—Package of 10	.42
	REPRODUCER ASSEMBLIES	
11232	Board—Terminal board assembly with two lead wire clips	.18
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil—(L20)	2.00
11233	Coil—Hum neutralizing coil—(L21)	.30
11258	Cone—Reproducer cone—(L22)—Package of 5	3.85
5118	Connector—3-contact male connector for reproducer	.25
5119	Connector—3-contact female connector plug for reproducer cable	.25
9619	Reproducer—Complete	6.05
11253	Transformer—Output transformer—(T2)	1.56
11886	Washer—Spring washer used to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
12038	Band—Rubber band used with tuning tube—Package of 10	.25
11996	Bracket—Tuning tube mounting bracket and clamp assembly	.22
11947	Cable—Two-conductor shielded cable approx. 35-in. long—connects volume control to input transformer	.85
11948	Cable—Three-conductor shielded cable approx. 24-in. long—complete with male connector stock 6123 and grid cap—connects volume control to chassis cable stock 11759	1.50
6123	Connector—4-contact male connector for cable stock 11948	.30
11276	Escutcheon—Tuning tube escutcheon	.40
11376	Escutcheon—Station selector escutcheon and crystal	.70
11582	Knob—Range switch knob—Package of 5	.50

The prices quoted above are subject to change without notice.

REPLACEMENT PARTS—Continued

Stock No.	Description	List Price	Stock No.	Description	List Price
11610	Knob—Station selector knob assembly—comprising one small and one large knob—Package of 5	1.00	4982	Spring—Retaining spring for large knob in Stock No. 11610—Package of 10	.26
11347	Knob—Volume control or tone control knob—Package of 5	.75	3391	Spring—Motor board mounting spring assembly—comprising one bolt, one "C" washer, two cup washers, one bottom spring, one lockwasher, and one cap nut	.50
11382	Resistor—1 megohm—Carbon type—1/10 watt—(R33)—Package of 5	.75			
11210	Screw—Chassis mounting screw assembly—Package of 4	.28			
11381	Socket—Tuning tube socket and cover	.45			
11349	Spring—Retaining spring for knobs, Stock No. 11347, No. 11582 and small knob in Stock No. 11610—Package of 5	.15	11949	Transformer—Phonograph input transformer—(T3, R26, R33, C40, C41, C52)	7.05

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SERVICE HINTS

(1) Excessive heating of the 6E5 tube may be due to high cathode current—in excess of 7 ma. The tube should be replaced and the condition of the 5Z4 rectifier checked.

(2) It is essential to maintain proper lubrication of phonograph motor to prevent irregular speed.