RCA VICTOR MODELS 9U and 9U2

Nine-Tube, Five-Band, A-C Radio-Phonographs
TECHNICAL INFORMATION

Electrical Specifications

FREQUENCY RANGES

"Long Wave" (X)	150-410 kc
"Standard Broadcast" (A)	530-1,800 kc
"Medium Wave" (B)	1,800-6,400 kc
"Short Wave" (C)	6,400-23,000 kc
"Ultra Short Wave" (D)	23,000-60,000 kc

ALIGNMENT FREQUENCIES

"Long Wave" (X)	175 kc (osc.), 350 kc (osc., det., ant.)
"Standard Broadcast" (A)	600 kc (osc.), 1,500 kc (osc., det., ant.)
"Medium Wave" (B)	6,000 kc (osc., det., ant.)
"Short Wave" (C)	20,000 kc (osc., det., ant.)
"Ultra Short Wave" (D)	57,000 kc (osc., det., ant.)

Intermediate Frequency ..... 460 kc

RADIOTRON COMPLEMENT

(1)	RCA-6K7 ..... R-F Amplifier	(5)	RCA-6H6 ..... Second Detector and A.V.C.
(2)	RCA-6L7 ..... First Detector	(6)	RCA-6F5 ..... Audio Voltage Amplifier
(3)	RCA-6J7 ..... Oscillator	(7)	RCA-6L6 ..... Power Output
(4)	RCA-6K7 ..... I-F Amplifier	(8)	RCA-6E5 ..... Tuning Tube
		(9)	RCA-5Z4 ..... Full-Wave Rectifier

PILOT LAMPS

Model 9U	(1)	Phono compartment ..... Mazda No. 40, 6.3 volts, 0.15 ampere
	(4)	Receiver ..... Mazda No. 46, 6.3 volts, 0.25 ampere
Model 9U2	(3)	Phono compartment, indicator, lower right-hand front of tuning dial, Mazda No. 40, 6.3 volts, 0.15 ampere
	(3)	Upper left-, lower left-, upper right-hand front of tuning dial, Mazda No. 46, 6.3 volts, 0.25 ampere

POWER SUPPLY RATINGS

Rating A-6 (Model 9U only)	105-125 volts, 60 cycles, 150 watts
Rating A-5 (Model 9U only)	105-125 volts, 50 cycles, 155 watts
Rating B-2	105-125 volts, 25 cycles, 150 watts
Rating C-6	105-130/140-160/200-250 volts, 60 cycles, 150 watts
Rating C-5	105-130/140-160/200-250 volts, 50 cycles, 155 watts

PHONOGRAPH

Type	Automatic Record Ejector
Record Capacity	Seven 10-inch or Six 12-inch
Turntable Speed	78 R.P.M.
Type of Pickup	Low-Impedance Magnetic
Pickup Impedance	8.5 ohms at 1,000 cycles

POWER OUTPUT RATINGS

Undistorted	5 watts
Maximum	9 watts

LOUDSPEAKER

Type	12-inch Electrodynamic
Impedance (V.C.)	2.2 ohms at 400 cycles

Mechanical Specifications

CABINET DIMENSIONS	MODEL 9U	MODEL 9U2
Height	43 inches	34 inches
Width	30⅞ inches	46¾ inches
Depth	18⅝ inches	18⅝ inches

WEIGHTS

Net	162 pounds	205 pounds
Shipping	222 pounds	287 pounds

Chassis Base Dimensions ..... 15 inches x 9¾ inches x 3 inches
Over-all Height of Chassis ..... 9¼ inches

OPERATING CONTROLS

Radio ..... (1) Music-Speech—Power Switch, (2) Volume, (3) Tuning, (4) Range Selector, (5) Tone
Phonograph ..... (1) Turntable Switch, (2) Radio-Phono Transfer Switch—Volume, (3) Index

Tuning Drive Ratios ..... 20 to 1 and 100 to 1

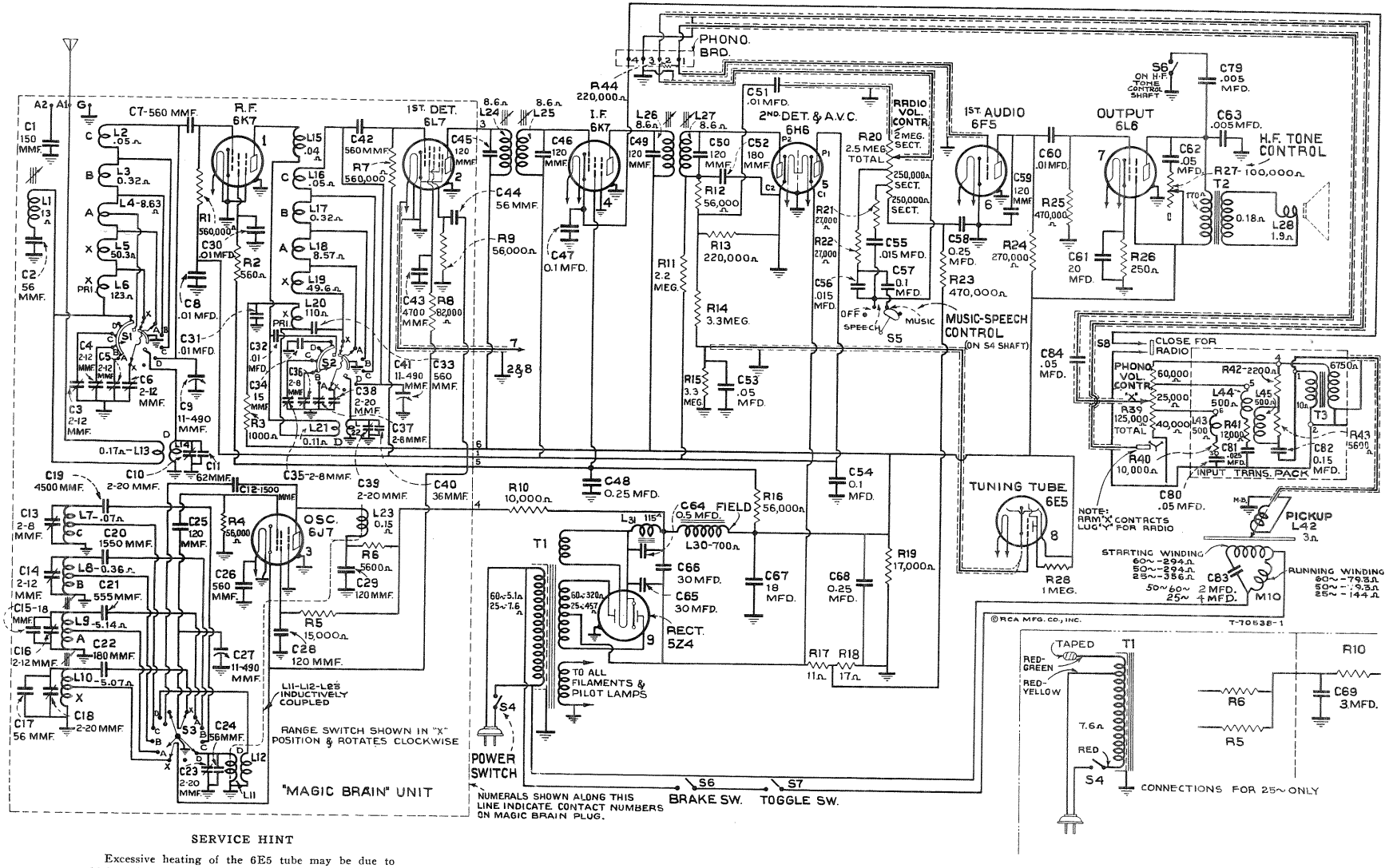


Figure 1—Schematic Circuit Diagram

SERVICE HINT

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.

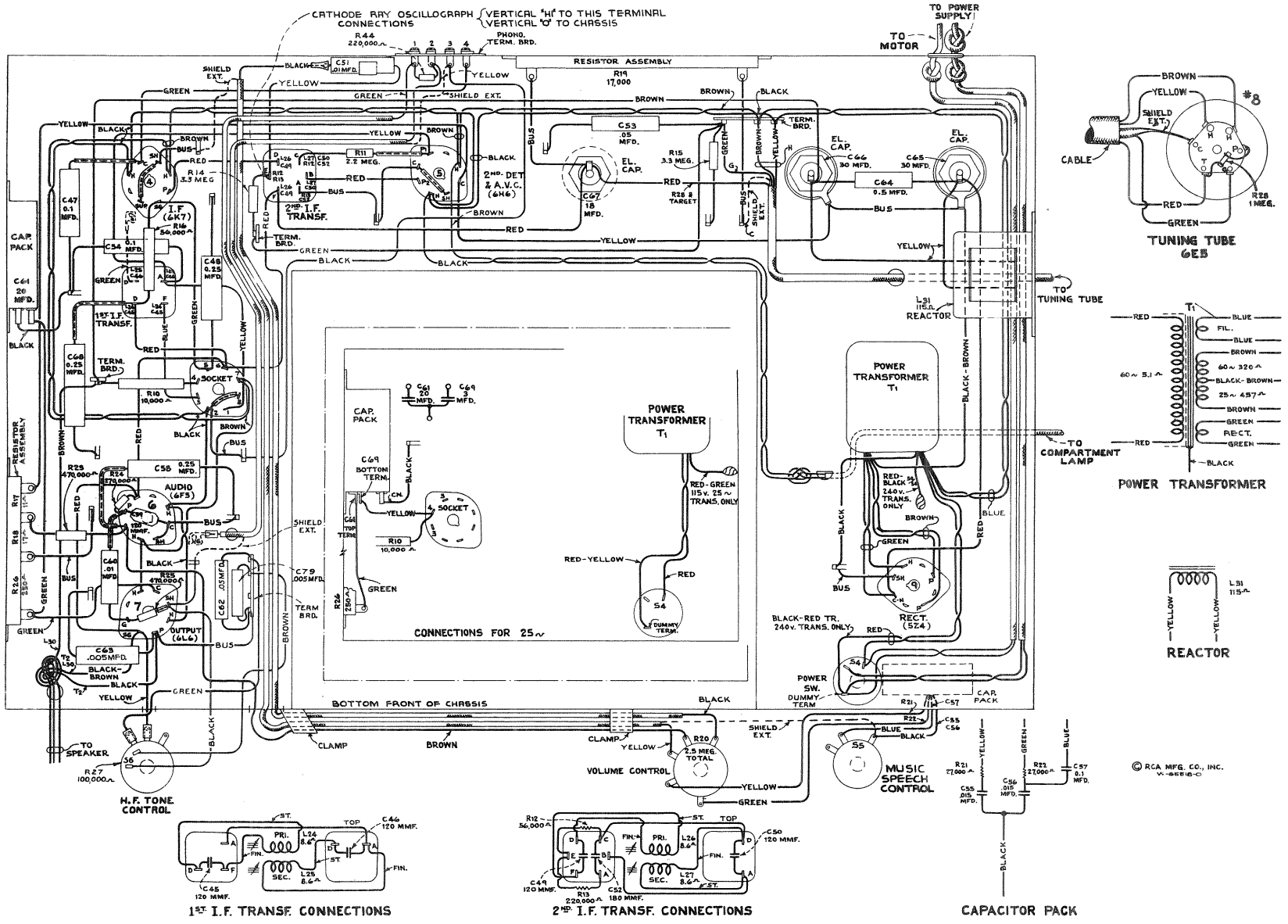


Figure 2—Chassis Wiring Diagram (Less "Magic Brain") Model 9U

General Description

The RCA Victor Models 9U and 9U2 combination instruments each consist of a nine-tube, five-band, "Magic Brain" superheterodyne receiver in combination with an automatically-operated phonograph, providing excellent entertainment from either radio reception or record reproduction. These instruments are electrically identical but differ in mechanical construction and cabinet design. Model 9U has the radio chassis mounted directly below the phonograph motor board with its controls operated from the front of the cabinet. Model 9U2 has its radio chassis mounted vertically to the right of the phonograph motor board. The respective controls in the phonograph and the radio compartments are made accessible by means of separate hinged covers at the top of the cabinet. Both instruments employ a twelve-inch electrodynamic loudspeaker and incorporate the newly-developed "Magic Voice." Design features include a built-in doublet antenna coupler; "Magic Brain"; improved plunger-type air-dielectric adjustable trimming capacitors in the antenna, detector, and oscillator coil circuits; tuned r-f amplifier; high-efficiency first detector (converter) with separate oscillator; beam-type power amplifier; magnetite core adjusted i-f transformers, low-frequency oscillator tracking, and wave-trap; two-point aural compensated radio and phonograph volume controls; music-speech switch; automatic volume control; continuously-variable high-frequency tone control; improved selector dial; dust-proof electrodynamic loudspeaker; and an automatic record player employing a synchronous motor.

Service convenience has been a controlling factor in the layout of the chassis parts and wiring. The assembly of these various elements is such that the number of conductors is minimized, with all important connections being readily accessible. Trimming adjustments are located at accessible points. A double tuning-knob arrangement permits the choice of either a twenty-to-one or a hundred-to-one dial drive ratio. The latter permits ease of tuning, especially in the "Medium wave," "Short wave," and "Ultra short wave" bands.

Circuit Arrangement

The conventional type of superheterodyne circuit is used. It consists of an r-f amplifier stage, first-detector (converter) stage, separate oscillator stage, an i-f amplifier stage, a diode-detector—automatic-volume-control stage, an audio voltage-amplifier stage, a beam-type power-amplifier stage, a tuning indicator "Magic Eye," and a full-wave rectifier.

"Magic Brain"

The new "Magic Brain" is constructed as a separate, self-contained, completely shielded, five-band, oscillator- detector- antenna-tuning unit which plugs into the main chassis.

A single-wire antenna, or a doublet antenna, when connected to the proper input terminals of the receiver, is coupled to the control grid of the RCA-6K7 r-f amplifier tube through the tuned r-f transformer consisting of L6, L5, L4, L3, and L2 (except when range selector is in "Ultra short wave" position). The primary coil L13 of the "Ultra short wave" (D) band tuned r-f transformer remains in the antenna circuit at all times. A unique method of switching is used. In the "Long wave" (X) band, L6 becomes the primary with L5, L4, L3, and L2 as secondary. In the "Standard broadcast" (A) band, L5 becomes the primary with L4, L3, and L2 as secondary (L6 shorted out). In the "Medium wave" (B) band, L4 becomes the primary with L3 and L2 as secondary (L6 and L5 shorted out). In the "Short wave" (C) band, L3 becomes the primary with L2 as secondary (L6, L5, L4, and tap on L4 shorted out). The tap on L4 is provided to prevent interaction with L3 and L2 when operating receiver in "Short wave" band. In the "Ultra short wave" (D) band, L6, L5, L4, and L3 are shorted out and grounded, and secondary L14 is placed in shunt with L2. The latter connection prevents undesirable interaction of L2 with L14. This method of switching reduces the total number of coils and leads, and results in having a low-loss primary and secondary winding for each band with high efficiency of operation.

The band switching of the detector circuits is similar to that of the antenna circuits. Coils L15, L21, and L20 are always connected in series with the plate circuit of the RCA-6K7 r-f amplifier tube. In the "Long wave" (X) band, L19, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is at the low end of L19. L20 acts as the primary which transfers energy to the secondary L19. Capacitor C33 resonates primary L20 at the proper frequency. In the "Standard broadcast" (A) band, L18, L17, and L16 are connected in series as the secondary circuit. The ground of the coil system is now between L18 and L19. L19 is used as the primary and is resonated at the proper frequency by capacitors C34 and C35 which are in shunt with this coil. Capacitor C33 is connected to transfer energy to the primary coil L19. In the "Medium wave" (B) band, L17 and L16 are connected in series as the secondary. The ground of the coil system is now between L17 and L18. L18 is used as the primary and is resonated at the proper frequency by capacitor C34 which is in shunt with this coil. L19 is shorted by the range selector. Capacitor C33 transfers the r-f energy from the plate circuit to the primary L18. In the "Short wave" (C) band, L16 is the secondary. The ground of the coil system is now between L16 and L17. L17 is used as the primary and is resonated to the proper frequency by capacitor C34. In addition, L15 acts as a high-frequency primary which resonates above 20 mc and improves the gain at the high-frequency end of the "Short wave" band. Coils L19 and L18 are shorted by the range selector. L21 is effectively r-f bypassed in this position by capacitor C32. In the "Ultra short

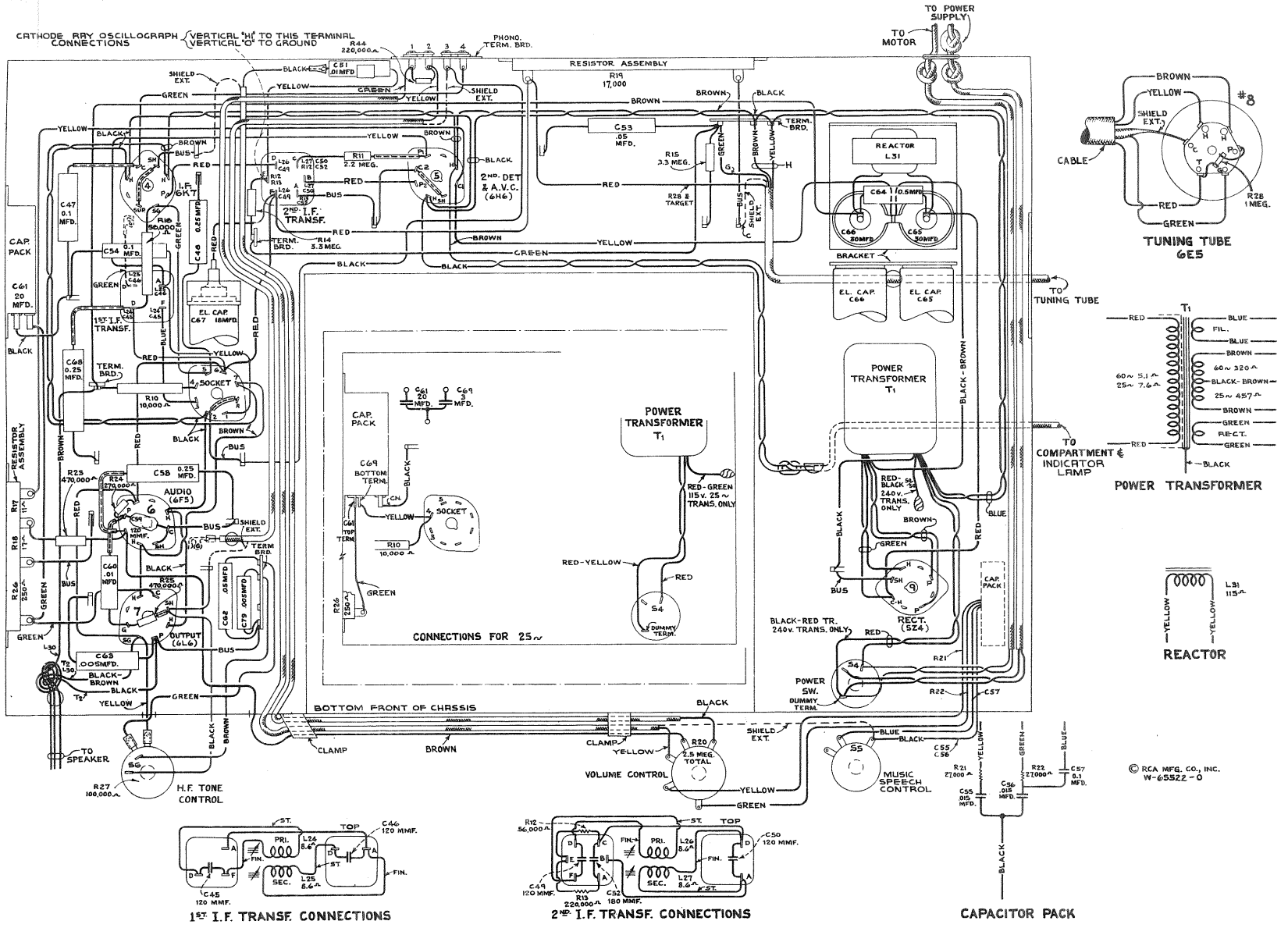


Figure 3—Chassis Wiring Diagram (Less "Magic Brain") Model 9U2

wave" (D) band, L22 is the secondary, or grid coil, and consists of approximately a single turn of silver plated strap around a 7/8-inch coil form. The primary coils, L21 and L15 are in series on this band, with L21 acting as a low-frequency primary and L15 as a high-frequency primary. L16 is shunted by L22 instead of being shorted directly by the range selector. Any inductive effect of L16 is thus eliminated. L19,

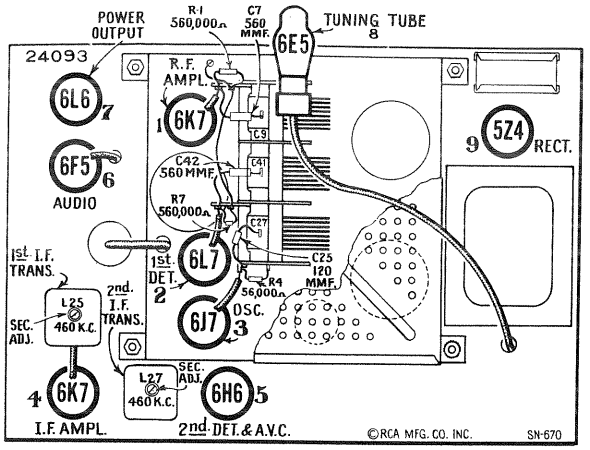


Figure 4—Radiotron and I-F Trimmer Locations

L18, and L17 are shorted directly by the range selector.

Separate windings, with the exception of L23, are employed in the oscillator stage for each position of the range selector. L23 (inductively coupled to L11 and L12) is placed in the oscillator plate circuit to provide additional feed-back when operating receiver on the "Ultra short wave" (D) band. This coil is effectively r-f bypassed by capacitor C12, when range selector is in the "Short wave" (C) position, to prevent undesirable reactions. Its effect on the remaining bands is negligible. The inherent stability of the oscillator circuit provides minimum frequency drift which is especially advantageous for high-frequency reception. The locally generated signal is capacitance coupled to grid No. 3 of the RCA-6L7 first detector.

The output of the "Magic Brain" is fed to the i-f amplifier through a plug-in cable. This cable also supplies all power required by the "Magic Brain" unit.

I-F Amplifier

The intermediate-frequency amplifier consists of an RCA-6K7 in a transformer-coupled circuit. The windings of these transformers are resonated with fixed capacitors, and are adjusted by molded magnetite cores (both primary and secondary) to tune to 460 kc.

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 (No. 2 diode). 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 resistors R12 and R13, is applied as automatic control-grid bias to the r-f, first-detector, and i-f tubes. The No. 1 diode of the RCA-6H6 is used to supply residual bias to the controlled tubes under conditions of little or no signal. This diode, under such conditions, draws current which flows through resistors R11, R12, and R13, thereby maintaining the desired operating bias on such tubes. On application of signal energy above a certain level, however, the No. 1 diode ceases to draw current and the a.v.c. diode takes over the biasing function.

Audio System

The manual radio 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 RCA-6F5 audio voltage-amplifier tube. This control has a two-point tone-compensating filter connected to it so that the correct aural balance will be obtained at different volume settings.

The output of the voltage amplifier is resistance-capacitance coupled to the control grid of the RCA-6L6 power output tube. The output of this stage is transformer coupled to the voice coil of the electrodynamic speaker.

The "Music-speech" control consists of a switch S5 which, in the "Speech" position, places an additional capacitor C57 in shunt with the capacitor C56 in one of the tone-compensating filters. This reduces the low-frequency response of the amplifier and provides maximum intelligibility of the voice frequencies.

The high-frequency tone control consists essentially of the combinations of capacitor C62 and variable resistor R27, capacitor C79 and switch S6 shunting the plate circuit of the output tube. When the tone control is in its extreme counter-clockwise position the resistance of R27 is a minimum, making capacitor C62 most effective, and switch S6 remains closed, connecting capacitor C79 across the plate circuit, providing maximum attenuation of the higher audio frequencies. As the control is turned clockwise, placing more resistance in series with capacitor C62, this capacitor becomes less and less effective and the upper frequency range of the audio amplifier is extended. When the tone control nears its extreme clockwise position, resistor R27 and switch S6 open, removing capacitors C62 and C79 respectively from the audio circuit, thereby increasing the higher audio frequency range of the system.

Phonograph

The electrical impulses generated in the pickup coil L42 are boosted in the input transformer T3 before they are fed to the input grid of the RCA-6F5 audio voltage-amplifier tube through the acoustically tapered phonograph volume control R39. The phonograph volume control also functions as a radio-phono transfer switch (see Schematic Diagram, figure 1). In the extreme counter-clockwise (radio) position, switch S8 is closed, completing the cathode circuit of the RCA-6K7 i-f amplifier tube, and the movable arm "X" (which is connected to the input grid of the RCA-6F5 through coupling capacitor C84) contacts lug "Y" (which is connected to the movable arm of

the radio volume control R20), permitting normal radio reception. As the phonograph control is rotated clockwise, switch S8 is immediately opened (opening the i-f cathode circuit and making the i-f amplifier inoperative), and the movable arm "X" slides over the tapped resistance strip, thereby functioning as a phonograph volume control. A compensation filter is placed in shunt with the output of transformer T3 to correct the frequency response of the reproducing system so as to compensate for the recording characteristic.

Automatic Record Changer

An improved automatic mechanism, employing a synchronous motor, is used in these models. It is of the record ejector type, having a record capacity of seven for the ten-inch type, and a capacity of six for the twelve-inch type. The turntable speed is fixed at 78 r.p.m. by the design of the drive motor and the intermediate gear mechanism. *This speed is invariable and does not vary as long as the supply line frequency remains constant.* The instrument may be purchased with any one of several ratings as specified under Electrical Specifications. *It is very important that a machine of any particular rating be operated at the voltage and frequency for which it is designed and rated.* Attempts to operate on other voltages or frequencies will result in improper reproduction from the phonograph system and possible damage to the equipment. The ejecting mechanism is arranged so that it will trip on various types of records. This is obtained by having a trip mechanism which is actuated by the rate of needle acceleration toward the center of the record.

"Magic Eye"

An RCA-6E5 cathode-ray tuning tube is used as a means of visually indicating when the receiver is accurately tuned to the incoming signal. This tube consists of an amplifier section and a cathode-ray section built in the same glass envelope. A portion of the signal voltage developed across resistor R13 is used to actuate the grid of the amplifier section. Maximum voltage is applied to this grid when the receiver is tuned to resonance with an incoming carrier. This condition is evidenced by the minimum width of the dark sector on the fluorescent screen.

"Magic Voice"

These instruments are designed with cabinets incorporating the "Magic Voice." This is accomplished by having the rear of the speaker compartment completely enclosed by a tight-fitting back.

Five metal open-end pipes of equal diameter but of three different lengths are inserted in holes in the cabinet base and extend upward in the speaker compartment. The effect is to cause the lower-frequency waves, reaching the front of the cabinet through the pipes, to arrive approximately in-phase with the sound waves emitted from the front of the speaker, giving extended low-frequency response without boominess, or cabinet resonance.

SERVICE DATA

The various diagrams in this booklet contain such information as will be needed to locate causes for defective operation if such develops. The values of the various resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagram. Identification titles, such as C1, L2, R1, etc., are provided for reference between the illustrations and the Replacement Parts List. The coils, reactors, and transformer windings are rated in terms of their d-c resistance only. Resistance values of less than one ohm are generally omitted.

Alignment Procedure

There are seventeen adjustments required for the alignment of the oscillator, first-detector, and antenna-tuned circuits; one adjustment for the wave-trap; and four adjustments for the i-f system. Fifteen of these adjustments are made with plunger-type air trimming capacitors and require the use of an **RCA Stock No. 12636 Adjusting Tool.** Each of these capacitors has a lock nut for securing the plunger in place after adjustment. The remaining seven adjustments are made by means of screws attached to molded magnetite cores. These cores change the inductance of the particular coils in which they are inserted to provide exact alignment. All of these adjustments are accurately made during manufacture and should remain in proper alignment unless affected by abnormal conditions of climate or purported alterations for servicing, or unless altered by other means. Loss of sensitivity, improper tone quality, and poor selectivity are the usual indications of improper alignment. Such conditions will usually exist simultaneously. Correct performance of this receiver can only be obtained when these adjustments have been made by a skilled service engineer with the use of adequate and reliable test equipment. The manufacturer of this receiver has such test equipment available for sale through its distributors and dealers.

The extensive frequency range of this receiver necessitates a more or less involved method of alignment. However, if the following directions are carefully applied in the sequence given, normal performance of the instrument will be obtained.

The plunger-type air trimming capacitors have their approximate plunger settings tabulated on figure 7. If the plungers have been disturbed from their original adjustments, they may be roughly set to the specified dimensions prior to alignment.

For alignment, the test-oscillator frequency should be quite accurate. A convenient and reliable means of accurately checking the frequency of test oscillators, receivers, etc., is the **RCA Stock No. 9572 Crystal Calibrator.**

If the test-oscillator signal cannot be heard as the receiver (heterodyne) oscillator air-trimmer plunger is changed from its minimum-capacity to maximum-capacity position (receiver dial and test oscillator set to the specified frequencies, and the correct oscillator air-trimmer used) it may be an indication that the

test-oscillator frequency is outside the range covered by the air-trimmer. Under such conditions, when a more accurate setting of the test oscillator cannot be determined, set the oscillator air-trimmer plungers to the approximate settings given on figure 7. Tune the test oscillator until the signal is heard in the speaker. Each of two test-oscillator settings (the fundamentals or the harmonics of which are **920 kc** apart) produce a signal. The low-frequency test-oscillator setting should be used as this places the test-oscillator (signal) frequency **460 kc** below the frequency of the receiver heterodyne oscillator.

Holes are provided in the top of the r-f and antenna coil cans on some models to enable a tuning check with the **RCA Stock No. 6679 Tuning Wand.** The hole in the top of the detector coil can has a cinch button which must be removed before insertion of the tuning wand. When the brass end of the wand is inserted in the coil, the inductance of the coil is decreased. If this results in an increase of output, the respective air-trimmer capacitance should be decreased (plunger pulled out). If inserting the iron end of the tuning wand causes an increase in output, resulting from an increase of inductance of the coil, the respective air-trimmer capacitance should be increased (plunger pushed in). If the range of the air trimmer is not sufficient to give the desired results, the lead-dress may be changed in the particular circuit being aligned, so as to cause the circuit to resonate within the range of the trimmer. An increase in the capacity-to-ground of the circuit will be required if the iron end of the tuning wand causes an increase of signal output when the air-trimmer plunger is full-in, while a decrease in the capacity-to-ground will be required if the brass end of the tuning wand causes an increase in signal output when the air-trimmer plunger is full-out.

In performing services on the "Magic Brain", the leads should be restored to their original positions, since the lead-dress is important for proper operation and dial calibration.

Precautionary Dressing of Leads for "Magic Brain" Alignment

(Refer to Figure 5)

Band "X"

1. Keep blue lead A of S1 to antenna coil L4-5 dressed away from chassis, and from yellow lead X of S1 to antenna coil L5-6.
2. Bus lead from C-10 to S1 should be as short as possible.
3. Keep blue lead A of S2 to detector coil L18-19 clear of chassis, coil shield, coil, and other leads.
4. Keep spaghetti lead C6 to X of S1 apart from spaghetti lead C5 to A of S1, and from chassis.

Band "A"

1. Keep green lead terminal S1 to antenna coil tap L4 away from chassis, coil shield, and coil.
2. Keep spaghetti lead C5 to A of S1 apart from spaghetti lead C6 to X of S1 and from chassis.

Band "C"

Lead from C19 to oscillator coil L7 should be maintained as short and straight as possible.

Two methods of alignment are applicable—one requires use of the cathode-ray oscillograph, and the other requires a voltmeter or glow-type indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave-image which represents the resonance characteristics of the circuit being tuned. This method is preferred because of the i-f characteristics of these receivers. This type of alignment is possible through use of apparatus such as the **RCA Stock No. 9558 Frequency Modulator** and the **RCA Stock No. 9545 Cathode-Ray Oscillograph.** If this equipment is not available, an approximate alignment may be performed by the output-indicator method with an instrument such as the **RCA Stock No. 4317 Neon Glow Indicator** attached across the loudspeaker voice coil. Alignment by this method is similar to the cathode-ray method outlined below except that the receiver volume control should be at maximum, the trimmers adjusted to peak response (with the exception of the wave-trap) and the test-oscillator sweeping operations omitted. Either of these methods require the use of a reliable test oscillator such as the **RCA Stock No. 9595.**

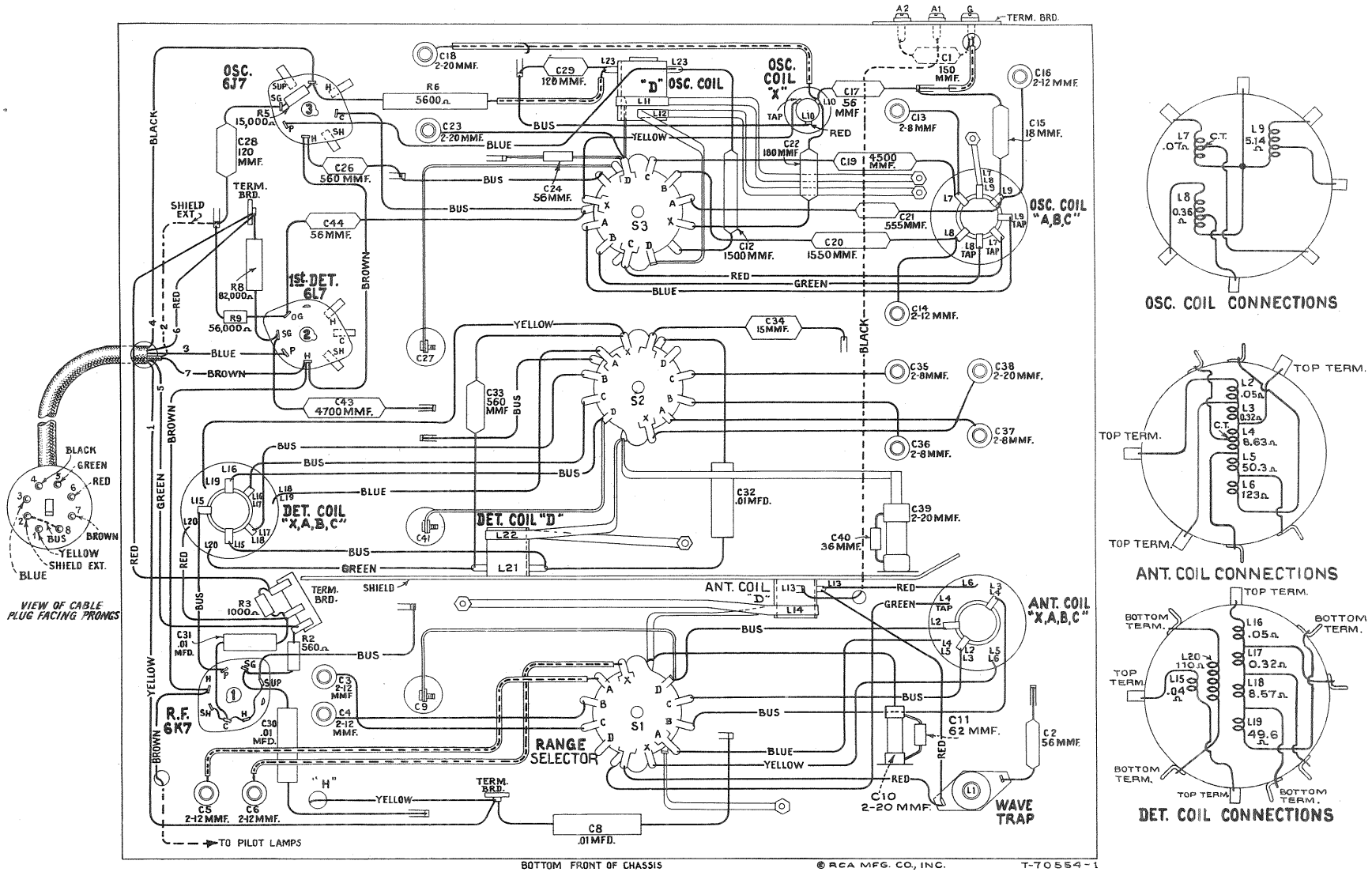
Cathode-Ray Alignment

Make alignment apparatus connections shown on figure 6. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Connect the receiver chassis to a good external ground. Connect oscillograph "Vertical" input terminals as indicated on figure 11. Set oscillograph power switch to "On" and adjust "Intensity" and "Focus" controls to give a clearly defined spot, or line, on the screen. Set oscillograph "Ampl. A" switch to "On," "Vertical gain" control full-clockwise, "Ampl. B" switch to "Timing," "Range" switch to No. 2 position, and "Timing" switch to "Int." Place the "Sync." control, "Freq." control, and "Horizontal gain" control to about their mid-positions. For each of the following adjustments, the test-oscillator output must be regulated so that the image obtained on the oscillograph screen will be of the minimum size for accurate observation. The receiver volume-control setting is optional.

I-F Adjustments

(a) Turn range selector to its "Standard broadcast" (A) position and tune receiver to a position of no extraneous signals near **600 kc.** Connect the "Ant." output of the test oscillator to the grid cap of RCA-6K7 i-f tube (with grid lead in place) through a **.001-mfd.** capacitor, with "Gnd." to receiver chassis. Tune the test oscillator to **460 kc** and place its modulation switch to "On" and its output switch to "Hi."

(b) Turn on the receiver and test oscillator. Increase the output of the test oscillator until a deflection is noticeable on the oscillograph screen. The figures obtained represent several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave-image formed (400-cycle waves) to be spread completely across the screen by adjusting the "Horizontal gain" control. The image should



OSC. COIL CONNECTIONS

ANT. COIL CONNECTIONS

DET. COIL CONNECTIONS

Figure 5—"Magic Brain" Wiring Diagram

be synchronized and made to remain motionless by adjusting the "Sync." and "Freq." controls.

(c) Adjust the two magnetite core screws **L27** and **L26** (see figures 4 and 11) of the second i-f transformer (one on top and one on bottom) to produce maximum vertical deflection of the oscillographic image. This adjustment places the transformer in exact resonance with the **460-kc** signal.

(d) The sweeping operation should follow using the frequency modulator. Shift the oscillograph "Timing" switch to "Ext." Insert plug of frequency-modulator cable in test-oscillator jack.

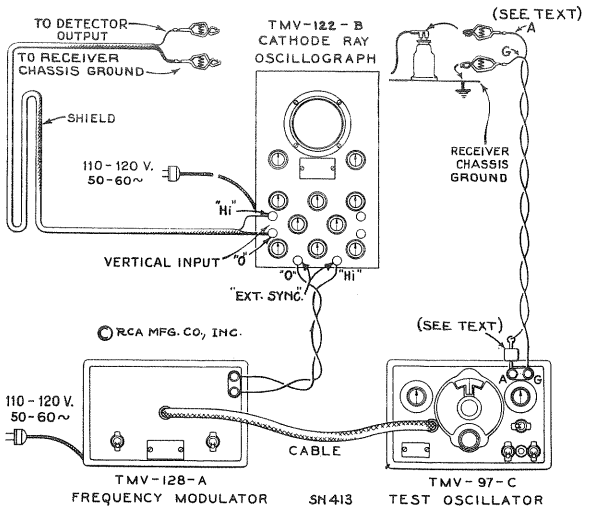


Figure 6—Alignment Apparatus Connections

Turn the test-oscillator modulation switch to "Off." Turn on the frequency modulator and place its sweep-range switch to "Hi."

(e) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. If only one wave appears, increase the "Freq." control on the oscillograph to obtain two waves. These waves will be identical in shape, totally disconnected, and appear in reversed positions. They will have a common base line, which is discontinuous. Adjust the "Freq." and "Sync." controls of the oscillograph to make them remain motionless on the screen. Continue increasing the test-oscillator frequency until these forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will be obtained at a test-oscillator setting of **approximately 575 kc.**

(f) With the images established as in (e), re-adjust the two magnetite core screws **L27** and **L26** on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(g) Without altering the adjustments of the apparatus, shift the "Ant." output of the test oscillator to the input of the i-f system, i.e., to the RCA-6L7 first-detector grid cap, through a **.001-mfd.** capacitor (with grid lead in place). Regulate the test-oscillator output so that the amplitude of the oscillographic image is approximately the same as used for adjustment (f) above.

(h) The two first i-f transformer magnetite core screws **L25** and **L24** (one on top and one on bottom) should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

Make receiver dial adjustments as outlined by "Selector dial," figure 12. Alignment must be made in sequence of "Wave-trap," "Ultra short wave" band, "Short wave" band, "Medium wave" band, "Standard broadcast" band, and "Long wave" band.

"Wave-Trap" Adjustment

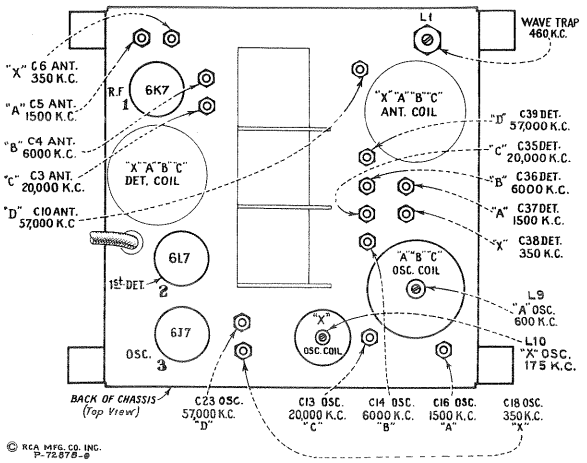
(a) Connect the output of the test oscillator to the antenna terminal "A1" through a **200-mmfd. (important)**, capacitor. Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Shift the oscillograph "Timing" switch to "Int." Place receiver range selector in "Standard broadcast" position. Set the receiver dial to a position of no extraneous signals **near 600 kc.** Tune the test oscillator to **460 kc.** Adjust the wave-trap magnetite core screw to the point which causes minimum amplitude of output (maximum suppression of signal) as shown by the waves on the oscillograph. An increase of the test-oscillator output may be necessary before this point of minimum amplitude, obtained by correct adjustment of wave-trap screw, becomes apparent on oscillograph screen.

"Ultra Short Wave" Band

(b) Connect the "Ant." output of the test oscillator to the antenna terminal "A1" of the receiver through a **300-ohm** resistor. Set the receiver range selector to its "Ultra short wave" position and its dial pointer to **57,000 kc.** Adjust the test oscillator to **19,000 kc.** The third harmonic of **19,000 kc** is used for this adjustment. If the indication on the oscillograph screen is not sufficient for the following adjustments at **57,000 kc,** the vertical-input terminals of the cathode-ray oscillograph may be connected thus: "Hi" to the plate contact of the RCA-6L6 power-output tube socket with the "0" terminal to chassis-ground. The receiver should be turned off while making this connection since the plate potential is impressed across the oscillograph input and a severe shock will result if contact is made between these two points. If this connection is made, advance the receiver volume control to its maximum posi-

tion. Adjust oscillator air-trimmer **C23** for maximum (peak) output. Two positions, each producing maximum output, may be found. The position of minimum capacitance (plunger near out) should be used. This places the receiver heterodyne oscillator **460 kc** higher in frequency than the incoming signal. Tighten lock nut. Adjust the detector air-trimmer **C39**, while slightly rocking the gang tuning condenser back and forth through the signal, for maximum (peak) output. Two peaks may be found on this trimmer. The peak of maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust the antenna air-trimmer **C10** for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found on this trimmer which produce maximum output. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to **56,080 kc.** If the image signal is received at this position, the adjustment of the oscillator air-trimmer **C23** has been correctly made. No adjustments should be made while checking for the image signal.

(c) Re-tune receiver for maximum response to **57,000 kc** (not image response) without disturbing test-oscillator adjustments. Change test oscillator to **6,800—14,000 kc** range. Tune test oscillator until signal is heard in speaker (should occur at approximately **14,250 kc,** fourth harmonic of



APPROX. DISTANCE IN INCHES-CHASSIS BASE TO TOP OF TRIMMER PLUNGER

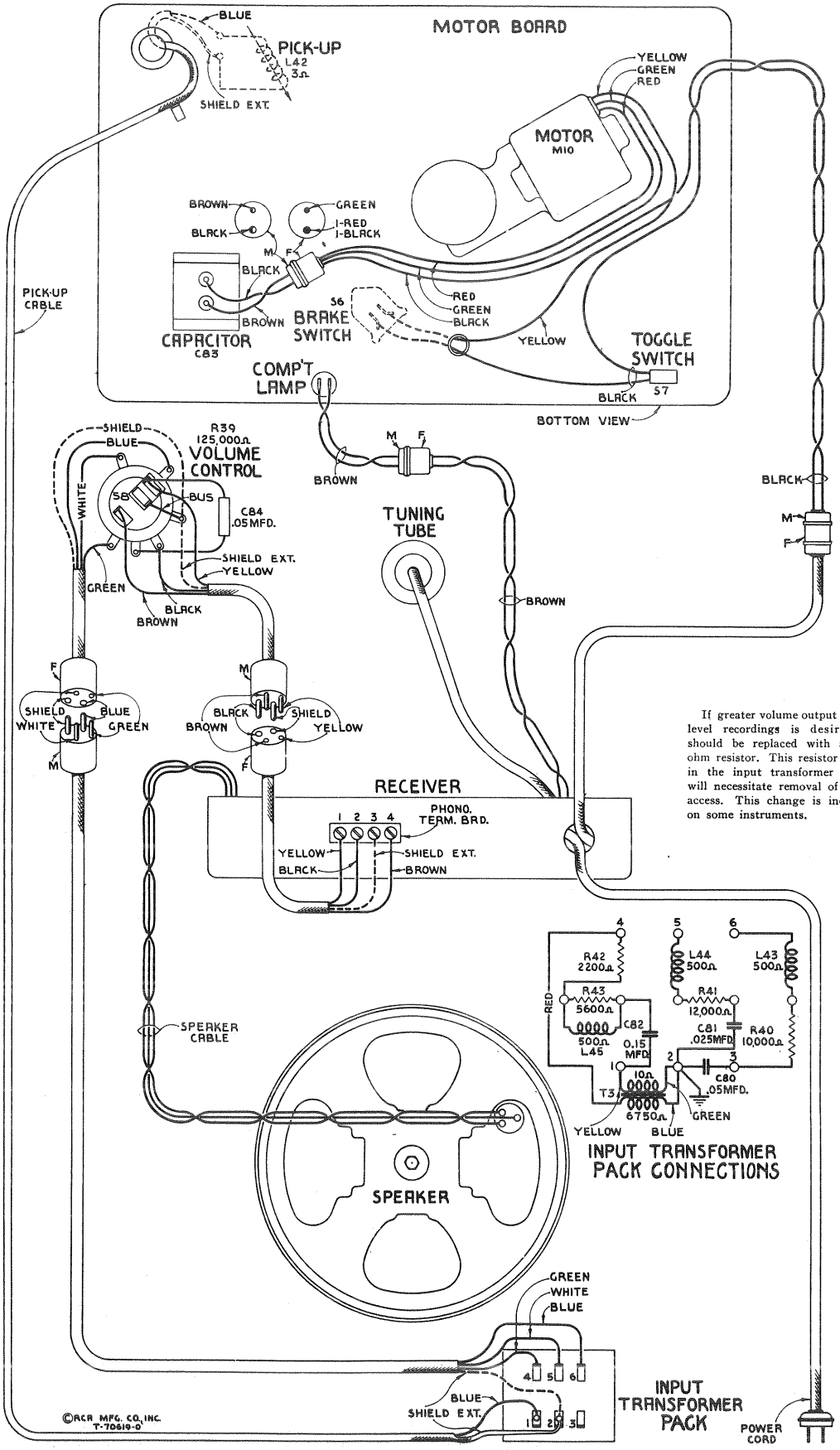
BAND	OSC.	DET.	ANT.
D	1 1/2	1 5/8	1 5/8
C	1 11/16	1 1/8	1 11/16
B	1 3/8	1 1/8	1 3/8
A	1 1/2	1	1 1/16
X	1 1/2	1 15/16	1 9/16

Figure 7—"Magic Brain" Trimmer Locations

test oscillator used). Two test-oscillator settings (**230 kc** apart) will produce a signal at this point. The lower frequency test-oscillator setting should be used, as this places the test oscillator harmonic **460 kc** below the frequency of the receiver heterodyne oscillator. Tune receiver for maximum response at a dial setting of approximately **28,500 kc** (image should tune in at a dial setting approximately **27,580 kc**) without altering test-oscillator adjustment. Test-oscillator second harmonic of **14,250 kc** is used for the following check. Check calibration of receiver dial. A receiver-dial reading of less than **28,500 kc** indicates that the inductance of the oscillator secondary coil **L11** is too low and should be increased. If the receiver dial reading is greater than **28,500 kc,** the inductance of **L11** is too high and should be decreased. If it is necessary to change the inductance of **L11,** first remove bottom cover of "Magic Brain" and then set receiver dial pointer to **28,500 kc.** To decrease inductance, move the grounded ends (straps) of **L11** and **L12** (see figure 5) nearer chassis. **Do not allow straps to touch chassis except where connected.** To increase inductance, move the straps farther away from chassis. Adjust position of straps till maximum (peak) output results. The alignment of the detector tuned circuit should next be checked at **28,500 kc** without changing either the receiver or test oscillator adjustments. An increase of output when the brass end of a tuning wand is brought near **L22** indicates that **L22** is too high in inductance, while an increase when the iron end is brought near the coil indicates that the inductance is too low. The inductance of **L22** may be varied by changing the spacing between the grounded end (strap) of **L22** and the strap connected from **C41** to contact on **S2** (figure 5). An increase of spacing will increase the inductance, while a decrease of spacing will decrease the inductance. Adjust the spacing until maximum (peak) output results. Replace "Magic Brain" bottom cover and repeat adjustments in (b) prior to those of "Short wave" band.

"Short Wave" Band

(d) Set the receiver range selector to its "Short wave" position and its dial pointer to **20,000 kc.** Adjust the test oscillator to **20,000 kc.** If the vertical input cathode-ray connections were changed for adjustment (b) above, they should be restored to their original position as shown on figure 11. Adjust oscillator air-trimmer **C13** until maximum (peak) output is reached. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust detector air-trimmer **C35** until maximum (peak) output is reached, while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C3** until maximum (peak) output is reached while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacity (plunger near in) should be used. Tighten lock nut. Check the image frequency by changing the receiver dial setting to **19,080**



If greater volume output from low-level recordings is desired, R-42 should be replaced with a 10,000-ohm resistor. This resistor is located in the input transformer pack and will necessitate removal of cover for access. This change is incorporated on some instruments.

Figure 8—Assembly Wiring

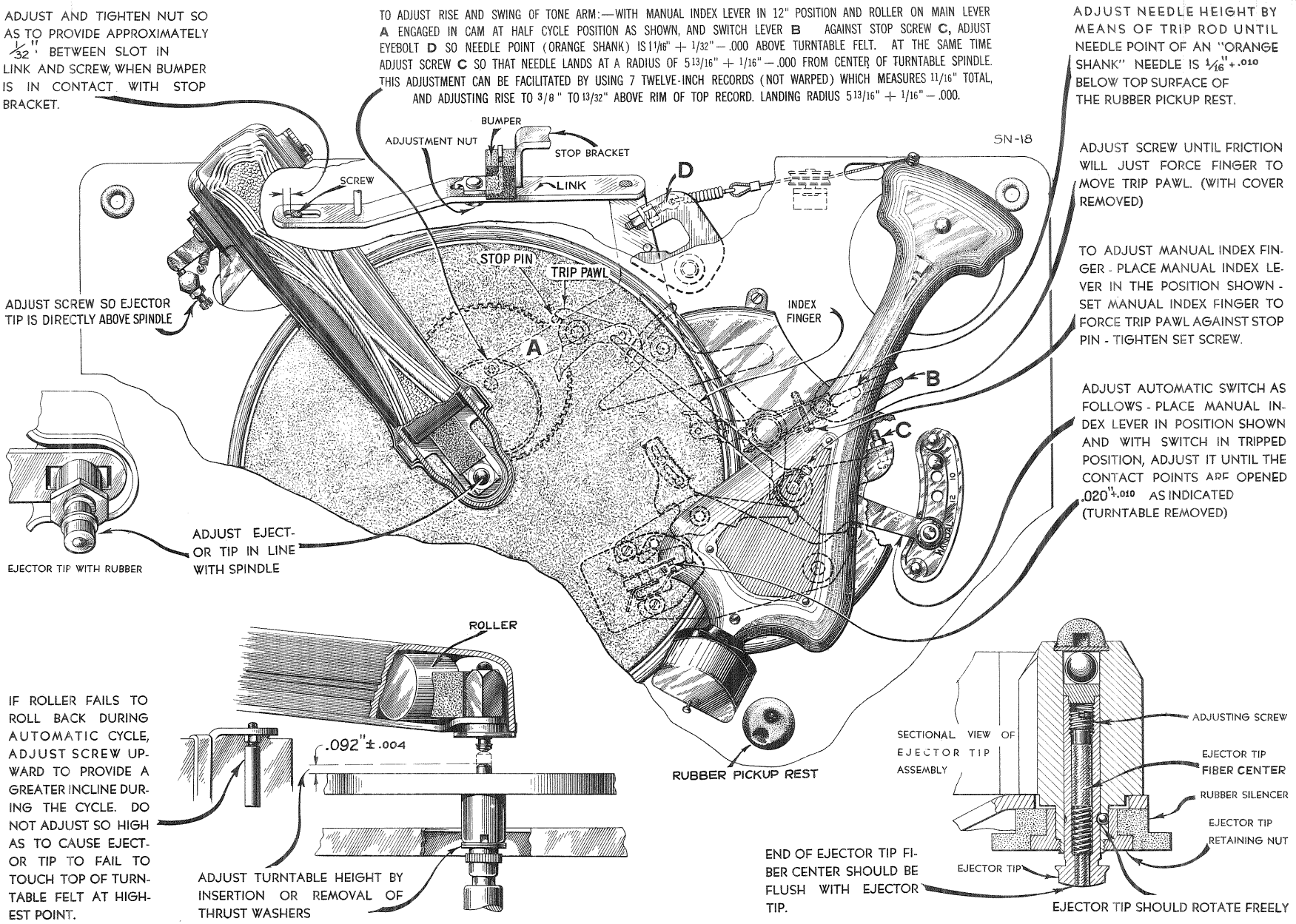


Figure 9—Automatic Record Changer Adjustments

kc. The image signal should be received at this position indicating that the adjustment of **C13** has been correctly made. No adjustments should be made while checking for the image signal.

"Medium Wave" Band

(e) Place receiver range selector to its "Medium wave" position with its dial pointer set to **6,000 kc.** Tune the test oscillator to **6,000 kc.** Adjust oscillator air-trimmer **C14** to produce maximum (peak) output as shown by the waves on the oscillograph. Two peaks may be found with this circuit. The peak with minimum capacitance (plunger near out) should be used. Tighten lock nut. Adjust the detector air-trimmer **C36** for maximum (peak) output while slightly rocking the gang tuning condenser back and forth through the signal. Two peaks may be found with this circuit. The peak with maximum capacitance (plunger near in) should be used. Tighten lock nut. Adjust antenna air-trimmer **C4** to produce maximum (peak) output. Tighten lock nut.

"Standard Broadcast" Band

(f) Remove the **300-ohm** resistor from between the test-oscillator "Ant." post and receiver antenna terminal "A1" and insert a **200-mmfd.** capacitor in its place. Place receiver range selector to "Standard broadcast" position with receiver dial pointer set to **600 kc.** Tune the test oscillator to **600 kc.** Adjust oscillator magnetite core screw **L9** (top of large oscillator coil can) for maximum (peak) output as shown by the waves on the oscillograph screen.

(g) Set receiver dial pointer to **1,500 kc.** Tune test oscillator to **1,500 kc** (1,500—3,100-kc range) and increase its output to produce a registration on the oscillograph screen. Carefully adjust the oscillator, detector, and antenna air-trimmers **C16, C37** and **C5,** respectively, to produce maximum (peak) output as shown by the waves on the oscillograph screen. Shift the oscillograph "Timing" switch to "Ext." Place the frequency modulator sweep-range switch to its "Lo" position and insert plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of **approximately 1,680 kc.** Adjust trimmers **C16, C37,** and **C5** again, setting each to the point which produces the best coincidence and maximum amplitude of the images.

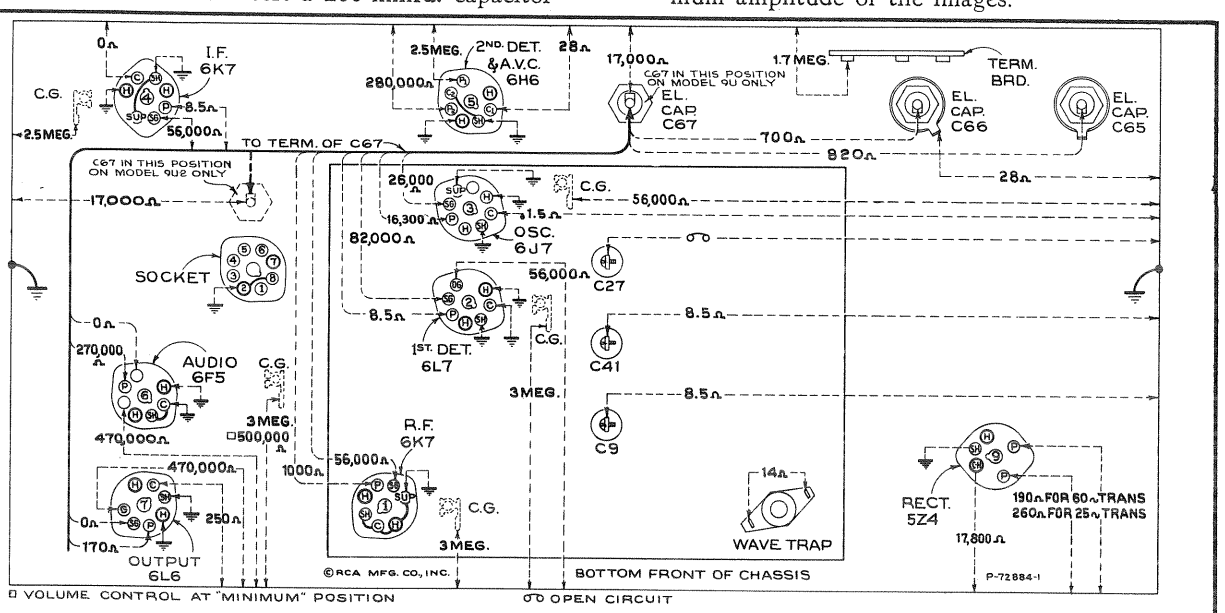


Figure 10—Resistance Diagram

Power supply disconnected—Radiotrons in sockets—Tuning condenser in full-mesh—Range selector in "Standard broadcast" position—Radio volume control clockwise—Phono volume control extreme counter-clockwise—Other controls optional

Resistance Measurements

The resistance values shown between Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground or other pertinent points on figure 10, permit a rapid continuity check of the circuits. The use of this diagram in conjunction with the Schematic Circuit Diagram, figure 1, and Wiring Diagrams, figures 2, 3 and 5, will permit the location of certain troubles which might otherwise be difficult to ascertain. Each value as specified should hold within ± 20%. Variations in excess of this limit will usually be indicative of trouble in circuit under test. When measuring the resistance between points of the circuit and ground, it will be necessary to connect the negative terminal of the resistance meter to chassis-ground. If the polarity of the resistance meter is not known, it may be readily ascertained by connecting a d-c voltmeter of indicated polarity across the terminals of the device.

(h) Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn test-oscillator modulation switch to "On." Set oscillograph "Timing" switch to "Int." Tune test oscillator to **200 kc** (200—400-kc range). Tune receiver for maximum response to this signal at a dial reading of **approximately 600 kc.** The third harmonic of the **200-kc** signal is used for this adjustment. Shift oscillograph "Timing" switch to "Ext." Insert the plug of the frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (increase frequency) until the forward and reverse waves show on the oscillograph screen. This will occur at a test-oscillator setting of **approximately 230 kc.** Disregarding the fact that the two images may or may not come together, adjust the oscillator magnetite core screw **L9** (top of large oscillator coil can) to produce maximum (peak) amplitude of the images. Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Repeat adjustments in (g) above to compensate for any changes caused by the adjustment of **L9** core, tightening lock nuts on **C16, C37,** and **C5,** respectively, after each is adjusted.

"Long Wave" Band

(i) Shift the oscillograph "Timing" switch to "Int." Remove the plug of the frequency-modulator cable from the test-oscillator jack. Turn the test-oscillator modulation switch to "On." Place receiver range selector to its "Long wave" position. Set the receiver dial pointer to **175 kc.** Tune the

Radiotron Cathode Current Readings

Measured with Milliammeter Connected at Tube Socket Cathode Terminal under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6K7—R-F	8.0 ma.
(2)	RCA-6L7—1st Det.	4.4 ma.
(3)	RCA-6J7—Osc.	6.7 ma.
(4)	RCA-6K7—I.F.	8.0 ma.
(5)	RCA-6H6—2nd Det.-A.V.C.	—
(6)	RCA-6F5—A.F.	0.3 ma.
(7)	RCA-6L6—Power	63 ma.
(8)	RCA-6E5—Eye	3.0 ma.
(9)	RCA-5Z4—Rect.	110 ma.*

(*Cannot be measured at socket)

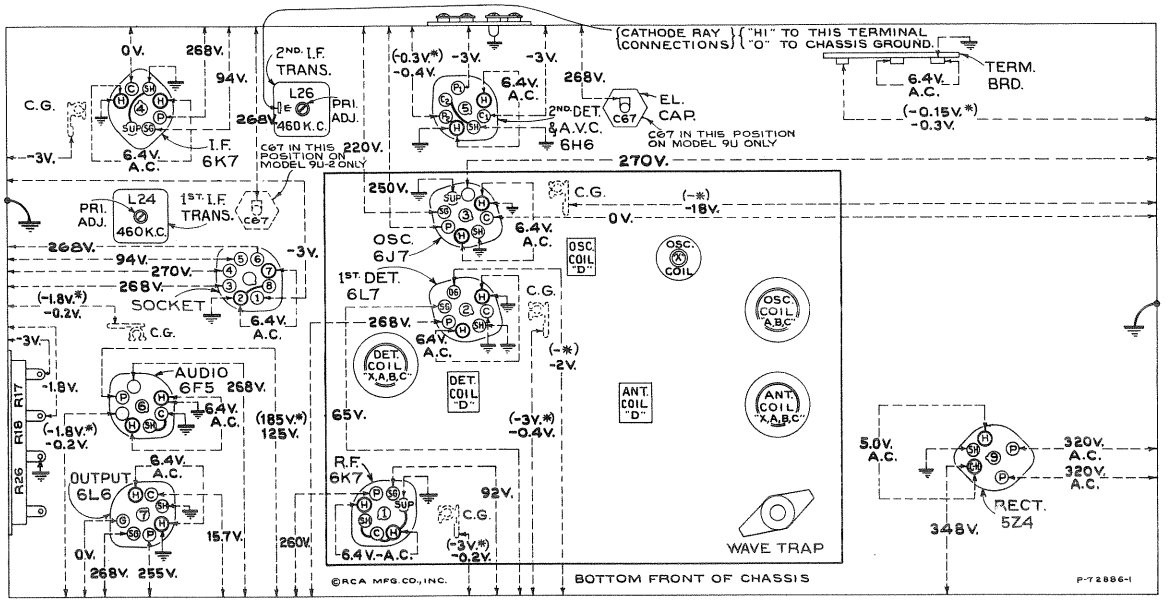


Figure 11—Radiotron Socket Voltages, Coil, and I-F Trimmer Locations

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc—No signal being received—Radio volume control counter-clockwise—Phono volume control extreme counter-clockwise—Other controls optional

Radiotron Socket Voltages

Note: Two voltage values are shown for some readings. The value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The other value (generally lower) is the actual measured voltage and differs from the value shown in parenthesis because of the additional loading of the voltmeter through the high series circuit resistance.

The voltage values indicated from the Radiotron socket contacts, grid caps, resistors, and terminals to receiver chassis ground on figure 11 will assist in locating cause for faulty operation. Each value as specified should hold within ± 20% when the receiver is normally operative at its rated line voltage. Variations in excess of this limit will usually be indicative of trouble in the basic circuits. To duplicate the conditions under which the voltages were measured requires a 1,000-ohm-per-volt d-c meter, having ranges of 10, 50, 250, 500, and 1,000 volts. Use the nearest range above the specified measured voltage. A-c voltages were measured with a corresponding a-c meter.

test oscillator to **175 kc** and increase its output until a deflection is noticeable on the oscillograph screen. Adjust oscillator magnetite core screw **L10** (located on top of small oscillator coil can) so that maximum (peak) amplitude of output is shown on the oscillograph screen.

(j) Set receiver dial pointer to **350 kc.** Tune test oscillator to **350 kc.** Adjust the oscillator, detector, and antenna air-trimmers **C18, C38,** and **C6** to produce maximum (peak) output as shown by the waves on the oscillograph screen. Without disturbing the connections, shift the oscillograph "Timing" switch to "Ext." Place the frequency-modulator sweep-range switch to its "Hi" position and insert plug of frequency-modulator cable in test-oscillator jack. Turn test-oscillator modulation switch to "Off." Re-tune the test oscillator (decrease frequency) until the forward and reverse waves show on the oscillograph screen and become coincident at their highest points. This will occur at a test-oscillator setting of **approximately 198 kc.** This setting places the test-oscillator frequency to **175 kc.** The second harmonic is now used for the **350 kc** adjustment. Adjust air-trimmers **C18, C38,** and **C6,** again, to produce maximum amplitude of the images and best coincidence throughout their lengths.

(k) Re-tune the receiver to **approximately 175 kc** so that the forward and reverse waves appear on the oscillograph screen. Adjust the oscillator magnetite core screw **L10** to produce maximum (peak) amplitude of the waves, disregarding the fact that the two images may or may not come together.

(l) Shift the receiver dial setting to **350 kc** without altering any other adjustments (frequency modulator still in operation). Adjust air-trimmers **C18, C38,** and **C6,** respectively, to produce maximum amplitude and best coincidence of the waves. These adjustments compensate for any changes caused by the adjustment of the magnetite core screw **L10.** Tighten lock nuts on **C18, C38,** and **C6,** respectively, after each is adjusted.

Selector Dial

Figure 12 illustrates the relation of the various parts of the dial mechanism when in its "Standard broadcast" position with the range switch likewise turned to its "Standard broadcast" position. In re-assembling the dial after repairs, see that the gears are meshed in accordance with the diagram, at the same time noting that the range switch in in its "Standard broadcast" position and the lever attached to the range-switch shaft placed in the position shown.

To adjust the dial mechanism, set the range switch to its "Standard broadcast" position. Place a straight-edge across the center of the dial so that its edge is even with the lower (end) marking at both the low-frequency and high-frequency ends of the dial. Under such conditions the straight-edge should be parallel with the top of the chassis base. If the straight-edge is not parallel with the top of the chassis base, loosen the nut on the rear of the roller link pivot stud and move the stud up or down until the link roller moves the dial to the desired position so that the end calibration marks obtain the position mentioned above. Tighten the nut on the roller link pivot stud.

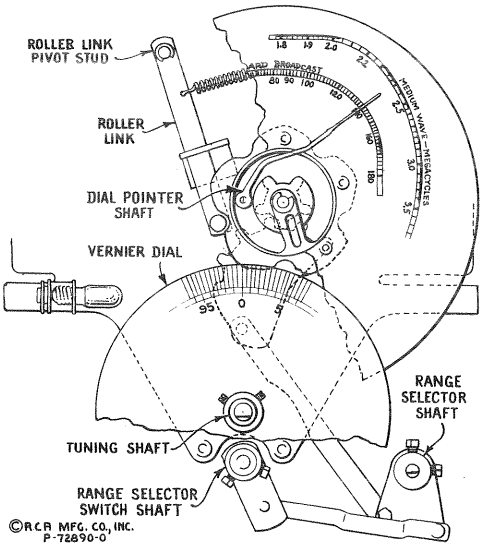


Figure 12—Selector Dial Change Mechanism

Set the gang tuning condenser to its maximum capacity position. Adjust the dial pointer to the low-frequency (end) mark on "Standard broadcast" scale. This is a friction adjustment.

With the gang tuning condenser plates still in full mesh, loosen the two set screws on the vernier-dial hub. Rotate the vernier dial until the "0" marking is in a vertical plane above the center of the shaft. Tighten set screws.

Antenna and Ground Terminals

These receivers are equipped with an antenna-ground terminal board having three terminals. These terminals are marked "A2," "A1," and "G," the latter being the ground terminal and should always be connected to a good external ground. The transmission-line leads of the RCA RK-40A antenna system should be connected to terminals "A2" and "A1." The receiver coupling units of the RCA RK-40 and the RCA Spider-Web antenna systems should be connected to terminals "A1" and "G." Connect a single-wire antenna to terminal "A1."

Magnetic Pickup

The pickup used in the phonograph unit is of an improved design. The horseshoe magnet is rigidly welded to the pole pieces and is irremovable. There is a centering spring attached to the armature to maintain proper adjustment and to provide a limiting effect on the movement of the armature. The frequency response is substantially uniform over a wide range. Service operations which may be necessary on the pickup are as follows:

Centering Armature

Refer to figure 13 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 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 at it did originally. Make certain that the block is in correct

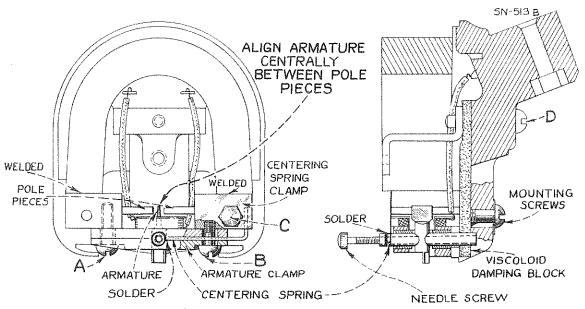


Figure 13—Details of Pickup

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 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 14 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 re-adjust the armature as previously explained after re-assembly of the mechanism. Only rosin core

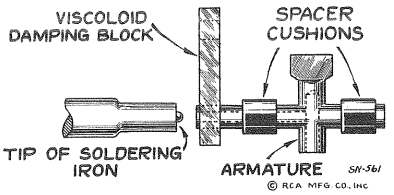


Figure 14—Special Soldering-Iron Tip

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 because the magnet and pole pieces are one unit and the magnetic circuit remains practically 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. To do this, it will be necessary to first remove the pickup mechanism from the tone arm, and then remove the magnet assembly. Place the magnet assembly on the poles of a standard pickup magnetizer such as the **RCA Stock No. 9549 Pickup Magnetizer** and charging the magnet in accordance with the instructions accompanying the magnetizer. It is preferable to check the polarity of the pickup magnet and to re-magnetize it so that the same polarity is maintained.

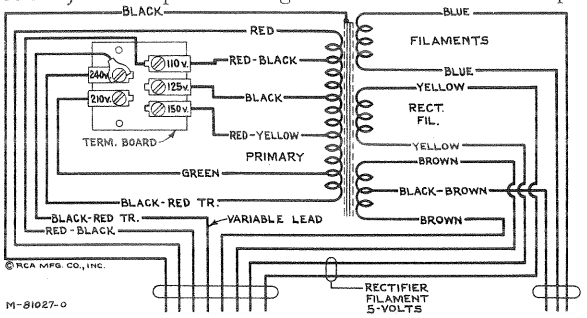
Automatic Record Ejector

The record changing mechanism is designed to be simple and fool-proof. 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.

It is important when servicing the automatic mechanism, to have it placed on a level support. It is also important to refrain from forcing the mechanism if there is a tendency to bind or jam, since bent levers and possibly broken parts may result.

The tip of the record ejector is adjustable in relation to the turntable spindle, the two being exactly

coaxial when properly adjusted. To align the tip, remove the rubber silencer of the ejector assembly, loosen ejector tip retaining nut and slide the tip



Primary resistance—10 ohms total
Secondary resistance—266 ohms total

Figure 15—Universal Transformer

assembly to the position where it is in true-line with the axis of the turntable spindle. This adjustment may be simplified by placing several records on the turntable, depressing the spindle through the top record hole and lining up the ejector tip in the spindle hole of the record.

To insure that the ejector tip rotates freely, apply a slight amount of oil to the shank of the tip at the point where it is in contact with the ball bearing.

Loudspeaker

Centering of the loudspeaker voice coil is made in the usual manner with three narrow paper feelers after first removing the front paper dust cover. This may be removed by softening its cement with a very light application of acetone using care not to allow

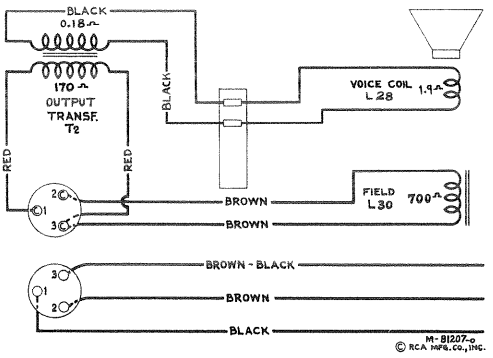


Figure 16—Loudspeaker Wiring

the acetone to flow down into the air gap. The dust cover may be cemented back in place with ambroid upon completion of adjustment.

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	
12863	Board—4 contact and 2 link phonograph terminal board	.25
4427	Bracket—Mounting bracket for H.F. tone control, L.F. tone control or volume control	.18
12867	Cable—Tuning lamp cable and socket	1.70
13230	Cable—2 conductor compartment and pilot lamp cable (chassis end) approx. 34-in. long complete with two female connectors Stock No. 11488—Model 9U2 only	1.30
12511	Cap—Grid contact cap—Package of 5	.15
12859	Capacitor Pack—Comprising two sections .015 Mfd., one section .1 Mfd., and two resistors 27,000 ohms each (C55, C56, C57, R21, R22)	1.50
12873	Capacitor Pack—Comprising one 3 Mfd. and one 20 Mfd. section used in 25 cycle Model only (C61, C69)	1.20
12724	Capacitor—120 Mmfd. (C59)	.28
12404	Capacitor—120 Mmfd. (C45, C46, C49, C50)	.26
12406	Capacitor—180 Mmfd. (C52)	.26
4838	Capacitor—.005 Mfd. (C63, C79)	.20
4624	Capacitor—.01 Mfd. (C51)	.54
4858	Capacitor—.01 Mfd. (C60)	.25
4836	Capacitor—.05 Mfd. (C53)	.30
4886	Capacitor—.05 Mfd. (C62)	.20
4841	Capacitor—0.1 Mfd. (C54)	.22
11414	Capacitor—0.1 Mfd. (C47)	.20
4840	Capacitor—.25 Mfd. (C58)	.30
5170	Capacitor—.25 Mfd. (C48, C68)	.25
12741	Capacitor—0.5 Mfd. (C64)	.30
5212	Capacitor—18 Mfd. (C67)	1.16
12872	Capacitor—20 Mfd. (C61)	.90
12467	Capacitor—30 Mfd. (C65, C66)	1.40
5119	Connector—3-contact female connector for speaker leads	.25
4573	Connector—2-contact female connector for motor cable (Chassis End)	.30
11488	Connector—2-contact female connector for phonograph compartment lamp cable (Chassis End)	.14
12006	Core—Adjustable core and stud for Stock No. 12652 and 12653	.22
12870	Dial—Vernier dial and disc assembly	.65
4340	Lamp—Dial lamp 6.3 volt, lower R.H. socket Model 9U2 only—Package of 5	.60
5226	Lamp—Dial lamp, 6.3 volt—Package of 5	.70
12868	Link—Range switch and band indicator operating link complete with set screw.	.45
12871	Reactor—Filter reactor (L31)	1.50
12865	Resistor—Voltage divider resistor—Comprising one section 250 ohm, one section 17 ohm, and one section 11 ohm (R17, R18, R26)	.45
12876	Resistor—10,000 ohms—wire wound—10 watt (R10)	.55
12864	Resistor — 17,000 ohms — wire wound (R19)	.70
11282	Resistor—56,000 ohms—carbon type—1/10 watt (R12)—Package of 5	.75
12875	Resistor—56,000 ohms—carbon type—1 watt (R16)—Package of 5	1.10
12264	Resistor—220,000 ohms — insulated — 1/4 watt (R44)—Package of 5	1.00
11398	Resistor—220,000 ohms—carbon type—1/10 watt (R13)—Package of 5	.75
11453	Resistor—270,000 ohms—carbon type—1/10 watt (R24)—Package of 5	.75
11172	Resistor—470,000 ohms—carbon type—1/4 watt (R23)—Package of 5	1.00

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REPLACEMENT PARTS—Continued

Stock No.	Description	List Price
11452	Resistor—470,000 ohms—carbon type—1/10 watt (R25)—Package of 5	.75
12013	Resistor—1 Megohm—carbon type—1/10 watt (R28)—Package of 5	.75
11626	Resistor—2.2 Megohm—carbon type—¼ watt (R11)—Package of 5	1.00
12874	Resistor—3.3 Megohm—carbon type—¼ watt (R14, R15)—Package of 5	1.00
4669	Screw—No. 8-32-5/32 set screw for link Stock No. 12868—Package of 10	.25
3903	Screw—No. 8-32-3/16 headless cup point set screw for Stock No. 12870—Package of 20	.36
12869	Shaft—Range switch and band indicator operating shaft and hub—assembly	.25
12008	Shield—I.F. transformer shield for Stock No. 12652, 12653	.28
12607	Shield—I.F. transformer shield top for Stock No. 12652	.30
12581	Shield—I.F. transformer shield top for Stock No. 12653	.36
12110	Shield—Shield cap for 6F5 Radiotron	.14
13095	Socket—Dial lamp socket, upper left or lower right hand	.25
11222	Socket—Dial lamp socket, upper right or lower left hand	.18
11381	Socket—Tuning lamp socket and cover	.45
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11198	Socket—7-contact 6H6, 6K7, 6L6, or 6F5 Radiotron socket	.15
11196	Socket—8-contact socket for R.F. Unit power cable plug	.15
12007	Spring—Retaining spring for Stock No. 12006	.36
12860	Tone Control—Low frequency tone control and power switch (S4, S5)	1.50
13468	Tone Control—High frequency tone control (R27, S6)	1.50
12652	Transformer—First I.F. transformer complete (L24, L25, C45, C46)	1.60
12653	Transformer—Second I. F. transformer complete (L26, L27, C49, C50, C52, R12, R13)	2.06
12856	Transformer—Power transformer, 105-125 volt, 50-60 cycle (T1)	5.35
12857	Transformer—Power transformer, 105-125 volt, 25 cycle (T1)	7.10
12858	Transformer—Power transformer, 100-250 volt, 50-60 cycle (T1)	8.75
12861	Volume Control—(R20)	1.00
	MAGIC BRAIN UNIT ASSEMBLIES	
12806	Board—3-contact antenna and ground terminal board	.25
5237	Bushing—Variable condenser mounting bushing assembly—Package of 3	.43
12886	Cable—Shielded power cable approx. 4-in. long complete with 8-contact male plug	1.50
12511	Cap—Grid contact cap—Package of 5	.15
12714	Capacitor—Adjustable trimmer capacitor (C3, C4, C5, C6, C14, C16)	.38
12807	Capacitor—Adjustable trimmer capacitor (C13, C35, C36, C37)	.35
12884	Capacitor—Adjustable trimmer capacitor (C10, C18, C23, C38, C39)	.40
12896	Capacitor—15 Mmfd. (C34)	.20
12722	Capacitor—18 Mmfd. (C15)	.20
12891	Capacitor—36 Mmfd. (C40)	.20
12629	Capacitor—56 Mmfd. (C24)	.20
12895	Capacitor—56 Mmfd. (C17)	.20
12723	Capacitor—56 Mmfd. (C2, C44)	.20
13307	Capacitor—62 Mmfd. (C11)	.20
12724	Capacitor—120 Mmfd. (C25, C28, C29)	.28
12725	Capacitor—150 Mmfd. (C1)	.28
12894	Capacitor—180 Mmfd. (C22)	.20
12727	Capacitor—555 Mmfd. (C21)	.20
12537	Capacitor—560 Mmfd. (C7, C26, C33, C42)	.20
12898	Capacitor—1,500 Mmfd. (C12)	.20
12729	Capacitor—1,550 Mmfd. (C20)	.26
12728	Capacitor—4,500 Mmfd. (C19)	.36
12897	Capacitor—4,700 Mmfd. (C43)	.40
4858	Capacitor—.01 Mfd. (C8, C30, C31, C32)	.25
12879	Coil—Antenna coil and shield, XABC bands (L2, L3, L4, L5, L6)	1.90
12888	Coil—Antenna coil, "D" band (L13, L14)	.60
12880	Coil—Detector coil and shield, XABC bands (L15, L16, L17, L18, L19, L20)	2.05
12709	Coil—Oscillator coil and shield, ABC bands (L7, L8, L9)	2.02
12881	Coil—Oscillator coil and shield, X band only (L10)	.80
12890	Coil—Oscillator coil, "D" band (L11, L12, L23)	.70
12889	Coil—R.F. coil, "D" band (L21, L22)	.65
12877	Condenser—3-gang variable tuning condenser (C9, C27, C41)	5.10
12887	Connector—8-contact male connector and cover for power cable, Stock No. 12886	.40
12664	Core—Adjustable core and stud for Stock No. 12654	.22
12800	Core—Adjustable core and stud for Stock No. 12709	.20
12882	Core—Adjustable core and stud for Stock No. 12881	.20
11324	Resistor—560 ohms — carbon type — ¼ watt (R2)—Package of 5	1.00
5112	Resistor—1,000 ohms—carbon type—¼ watt (R3)—Package of 5	1.00
11298	Resistor—5,600 ohms — carbon type — 1 watt (R6)	.22
3998	Resistor—15,000 ohms—carbon type, ¼ watt (R5)—Package of 5	1.00
11282	Resistor—56,000 ohms — carbon type — 1/10 watt (R4, R9)—Package of 5	.75
8064	Resistor—82,000 ohms—carbon type, ½ watt (R8)—Package of 5	1.00
11397	Resistor—560,000 ohms—carbon type—1/10 watt (R1, R7)—Package of 5	.75
12651	Shield—Coil shield for Stock Nos. 12879 and 12880	.22
12710	Shield—Coil shield for Stock No. 12709	.28
12883	Shield—Coil shield for stock No. 12881	.20
11198	Socket—7-contact 6K7 Radiotron socket	.15
11279	Socket—7-contact 6L7 Radiotron socket	.20
12885	Socket—8-contact 6J7 Radiotron socket	.20
12007	Spring—Retaining spring for core, Stock Nos. 12664, 12800, 12882—Package of 10	.36
12878	Switch—Range switch and mounting nut (S1, S2, S3)	3.60
12654	Trap—Wave-trap, complete (L1)	.75
	DRIVE ASSEMBLIES	
10705	Ball—5/32-inch diameter steel ball for planetary drive—Package of 20	.25
10941	Ball—⅛-inch diameter steel ball for planetary drive bearing—Package of 20	.25
12904	Bushing—Plate and bushing assembly for planetary drive mounting	.20
12905	Coupling—Flexible coupling and shaft assembly, complete	.50
12909	Dial—Band indicating dial and cam assembly	1.05

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REPLACEMENT PARTS—Continued

Stock No.	Description	List Price
12899	Drive—Variable tuning condenser drive, complete, including mounting bracket, drive, dial scale and indicator, less vernier dial, Stock No. 12870, and link, Stock No. 12868	4.40
12906	Gear—Anti-lash drive gear, complete	.75
12910	Gear—Sector gear and link assembly for band selector	.20
12908	Indicator—Station selector indicator pointer	.20
8051	Link—Link and roller assembly, complete with spring	.30
12911	Screen—Dial lamp and light diffuser	.20
4669	Screw—Set screw for flexible coupling or gear, Stock Nos. 12905 and 12906—Package of 10	.25
12901	Shaft—Direct drive shaft and pinion gear for planetary drive	.75
12900	Shaft—Vernier drive shaft for planetary drive	.25
12903	Spring—Tension spring for planetary drive bearing—Package of 10	.20
12907	Spring—Tension spring for gear, Stock No. 12906—Package of 10	.20
8052	Spring—Tension spring for link, Stock No. 8051—Package of 5	.32
	EJECT ARM ASSEMBLIES	
11541	Arm—Eject arm, complete	8.15
11533	Ball—1/16-inch diameter steel ball—Package of 10	.20
10129	Ball—3/16-inch diameter steel ball—Package of 20	.25
11529	Bearing—Ejector tip bearing and nut	.32
11538	Bracket—Eject arm bracket	1.72
11537	Collar—Eject arm shaft collar and set screw	.24
11540	Cover—Eject arm cover	1.52
11536	Cushion—Counter balance roller cushion located inside of eject arm	.14
4055	Post—Vertical adjustment post—located on eject arm bracket	.30
3729	Roller—Eject arm counter balance roller—located inside of eject arm	.45
4580	Screw—No. 6—32-3/16-inch square head set screw for eject arm collar—Package of 10	.25
11534	Screw—No. 8—36-7/32-inch special screw for eject arm tip center adjustment—Package of 10	.14
11535	Shaft and Collar—Eject arm vertical action shaft and collar assembly	.15
11528	Silencer—Ejector tip silencer	.14
4067	Spring—Ejector arm bracket spring—Package of 10	.30
11531	Spring—Ejector tip spring—Package of 10	.42
11530	Tip—Ejector tip with tip center, adjusting screw and cap	.32
11539	Yoke—Eject arm yoke assembly	.94
	PICKUP AND ARM ASSEMBLIES	
13469	Arm—Pickup arm, complete less pickup unit	6.00
11724	Armature—Pickup armature	.38
11548	Back—Pickup back	.52
4064	Cable—Pickup arm operating cable—Package of 5	1.00
11722	Coil—Pickup coil (L24)	.52
13470	Connector—Shielded pickup cable and connector assembly—approximately 59 inches long	.90
11545	Cover—Pickup front cover	.22
11546	Cover—Pickup back cover with mounting screws	.14
3737	Damper—Pickup damper—Package of 5.	.65
3516	Damper—Damper assembly for pickup arm base—Comprising one upper and one lower damper, one upper bushing and one lower bearing	.14
11723	Escutcheon—Pickup arm escutcheon	.62
11721	Pickup—Pickup unit, complete	5.50
11549	Screw—Pickup front cover screw—Package of 10	.42
3387	Screw—Nut and washer for mounting pickup to arm—Package of 10	.50
11547	Screw—Pickup needle screw—Package of 10	.42
	OPERATING MECHANISM	
6502	Cam—Cam and gear assembly	1.18
6808	Clutch—Trip lever friction clutch	.30
11558	Cover—Metal cover for trip lever and friction finger assembly	.36
6809	Finger—Manual index lever finger assembly	.25
3670	Finger—Friction finger assembly	.32
11554	Lever—Manual index lever—less pin	.62
11556	Lever—Main lever and link assembly	2.10
11557	Lever—Main spring lever	.42
3677	Lever—Pickup arm cable lever assembly—Comprising lever with cable screw, spring and nut	.40
11555	Lever—Trip lever and friction clutch assembly	.94
6503	Pawl—Trip pawl assembly	.40
4124	Plate—Eject arm actuating plate assembly	.50
4563	Screw—Cable lever screw and nut—Package of 10	.60
4564	Screw—Manual index lever finger set screw—Package of 10	.20
4059	Screw—Trip lever clutch tension adjustment screw—Package of 10	.22
4566	Screw—Special screw used to fasten main lever and link assembly bushing—Package of 10	.30
11559	Spacer—Pickup arm mounting spacer	.28
4127	Spring—Actuating spring—Package of 10	.24
3666	Spring—Cable lever tension spring—Package of 10	.44
4565	Spring—Manual index lever finger tension spring—Package of 10	.30
4061	Spring—Main spring lever tension spring—Package of 10	.38
2893	Spring—Trip lever latch plate tension—Package of 10	.30
2917	Washer—Spring washer—"U" type—Package of 10	.25
	MOTOR ASSEMBLIES	
9735	Motor—105-125 volts—25 cycles (M1)	49.50
9651	Motor—105-125 volts—50 cycles (M1)	35.35
9650	Motor—105-125 volts—60 cycles (M1)	35.35
12050	Suspension Spring—Motor mounting spring, washer, and stud assembly—Comprising six springs, six cup washers, three spring washers and three studs	.60
	AUTOMATIC SWITCH ASSEMBLIES	
3994	Cover—Motor switch cover	.26
10184	Plate—Automatic brake latch plate—Package of 5	.40
10174	Springs—Automatic brake springs—Package of 2 sets	.50
6805	Switch Assembly—Automatic switch, complete	1.90
3322	Switch—Motor switch (S6)	.75

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REPLACEMENT PARTS—Continued

Stock No.	Description	List Price
	MOTOR BOARD ASSEMBLIES	
11881	Base—Phonograph compartment lamp socket and base	.55
12051	Capacitor—2 Mfd., complete with 2-contact male connector for use with motor, Stock No. 9650 or No. 9651 only (C83)	4.18
13101	Capacitor—4 Mfd., complete with 2-contact male connector for use with motor, Stock No. 9735 only (C83)	5.05
4674	Connector—2-contact male connector for Stock Nos. 12051, 13101 or phono compartment lamp leads	.25
4577	Connector—2-contact male connector motor cable	.30
11488	Connector—2-contact female connector for motor leads	.14
11542	Cover—Turntable cover	.88
11553	Escutcheon—Index escutcheon engraved "Manual—12—10"	.44
4340	Lamp—Phonograph compartment lamp—6.3 volts—Package of 5	.60
3764	Nut—Cap nut for motor board suspension assembly—Package of 4	.40
3672	Pin—Manual index pin	.42
11551	Rest—Pickup rest	.14
3654	Roller—Pickup arm cable guide roller—Comprising bracket, roller and guide pin	.34
11711	Shade—Phonograph compartment lamp shade	.16
3763	Suspension Spring—Suspension spring, washer and bolt assembly for motor board—Comprising one bolt, two cup washers, two springs, two "C" washers and one cap nut	.42
4671	Switch—Operating switch—toggle type (S7)	.72
11599	Turntable—Complete	2.90
	MISCELLANEOUS CABLE ASSEMBLIES	
13226	Cable—3-conductor shielded compensator cable (volume control end), approximately 18 inches long, complete with one 4-contact female connector, Stock No. 12494	2.20
13227	Cable—3-conductor shielded compensator cable (transformer end), approximately 8 inches long, complete with one 4-contact male connector, Stock No. 12565 and three pin type terminals—for Model 9U2 only	1.45
13232	Cable—3-conductor shielded compensator cable (transformer end), approximately 27 inches long, complete with one 4-contact male connector, Stock No. 12565 and three pin type terminals—for Model 9U only	2.00
13225	Cable—3-conductor shielded volume control cable (chassis end), approximately 13 inches long, complete with one 4-contact female connector, Stock No. 12494—for Model 9U2 only	1.75
13228	Cable—3-conductor shielded volume control cable (control end), approximately 9½ inches long, complete with one 4-contact male connector, Stock No. 12565	1.55
13231	Cable—3-conductor shielded volume control cable (chassis end), approximately 24 inches long, complete with one 4-contact female connector, Stock No. 12494—for Model 9U only	2.00
12494	Connector—4-contact female for cable, Stock Nos. 13225, 13226 or 13231	.18
12565	Connector—4-contact male for cable, Stock Nos. 13227, 13228 or 13232	.20
	REPRODUCER ASSEMBLIES	
12914	Board—3-contact reproducer terminal board	.25
12640	Bracket—Output transformer mounting bracket and clamp assembly	.18
12912	Coil—Field coil (L30)	1.70
12667	Cone—Reproducer cone and dust cap (L28)	1.00
5118	Plug—3-contact male reproducer plug	.25
9736	Reproducer—Complete	8.70
12913	Transformer—Output transformer (T2)	1.45
11886	Washer—Spring washer to hold field coil securely—Package of 5	.20
	MISCELLANEOUS ASSEMBLIES	
4391	Box—Used needle box	.70
11996	Bracket—Tuning lamp mounting bracket and clamp	.22
13103	Cap—Pilot lamp cap—Package of 5—Model 9U2 only	.65
4836	Capacitor—.05 Mfd. (for phonograph volume control) (C84)	.30
12915	Crystal—Station selector escutcheon and crystal	1.30
11580	Cover—Pilot lamp cover—Model 9U2 only	.12
12742	Escutcheon—Tuning lamp escutcheon	.22
4340	Lamp—Pilot lamp—6.3 volts—Package of 5—Model 9U2 only	.60
12699	Knob—Large station selector knob—Package of 5	.68
11347	Knob—Low frequency tone control and power switch phonograph or radio volume control, range switch, or high frequency tone control knob—Package of 5	.75
12700	Knob—Small (vernier) station selector knob—Package of 5	.58
11607	Receptacle—Needle card holder	.38
11210	Screw—Chassis mounting screw assembly for Model 9U only—Package of 4	.28
4560	Screw—Chassis mounting screw assembly (front)—Comprising one screw, one washer and one lockwasher—Package of 10—Model 9U2 only	.30
13102	Screw—Chassis mounting screw assembly (bottom)—Comprising one screw, two cushions, one spacer, one washer and one lockwasher—Package of 2—for Model 9U2 only	.30
12916	Shield—Complete R.F. unit shield	.90
11573	Socket—Pilot lamp socket—Model 9U2 only	.28
11349	Spring—Retaining spring for knob, Stock Nos. 11347 and 12700—Package of 5	.25
4982	Spring—Retaining spring for knob, Stock No. 12699—Package of 10	.50
13415	Tube—Magic voice tube—7 inches long	.35
13416	Tube—Magic voice tube—8 inches long	.35
13417	Tube—Magic voice tube—9 inches long	.35
13127	Transformer—Phonograph input transformer—Comprising one transformer, three choke coils, three capacitors and four resistors (T3, L43, L44, L45, C80, C81, C82, R40, R41, R42, R43)	6.40
13126	Volume Control—Phonograph volume control and switch (R39, S8)	1.50

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