RCA Victor

MODELS 86E, 86K, 86K7, 86T, 86T1, 87K, and 87T

Six- and Seven-Tube, Three-Band, A-C, Superheterodyne Receivers

TECHNICAL INFORMATION AND SERVICE DATA

-1937 No. 19-

SERVICE DIVISION • RCA MANUFACTURING COMPANY, INC. • CAMDEN, N. J., U. S. A.

A Service of the Radio Corporation of America

Electrical Specifications

FREQUENCY RANGES

"Broadcast" (A)	530- 1,720 kc
"Medium Wave" (B)	2,100- 6,800 kc
"Short Wave" (C)	6,800-22,000 kc

R-F ALIGNMENT FREQUENCIES

"Short Wave" (C)	20,000 kc (osc.)
"Medium Wave" (B)	6,000 kc (osc., ant.)
"Broadcast" (A)	600 kc (osc.), 1,500 kc (osc.)

Intermediate Frequency ..... 460 kc

RADIOTRON COMPLEMENT

(1) RCA-6A8	First Detector—Oscillator
(2) RCA-6K7	Intermediate Amplifier
(3) RCA-6H6	Second Detector and A.V.C.
(4) RCA-6F5	Audio Voltage Amplifier
(5) RCA-6F6	Audio Power Amplifier
(6) RCA-5W4	Full-Wave Rectifier
(7) RCA-6G5 (Models 87K and 87T only)	Tuning Tube

Pilot Lamps (2) ..... Mazda No. 46, 6.3 volts, 0.25 amp.

POWER SUPPLY RATINGS

Rating A	105-125 volts, 50-60 cycles, 80 watts
Rating B	105-125 volts, 25-60 cycles, 80 watts
Rating C	100-130/140-160/195-250 volts, 40-60 cycles, 80 watts

POWER OUTPUT

Undistorted	2.5 watts
Maximum	4.5 watts

LOUDSPEAKER

Type	Electrodynamic
Impedance (v.c.)	(RL-70E-1) 2.2 ohms (84001-3) 2.6 ohms (84001-6) 4.7 ohms — at 400 cycles

Mechanical Specifications

MODELS	86E	86K	86K7	86T	86T1	87K	87T
Height (inches)	23⅛	38	40	11 7/16	11⅞	40	11 5/16
Width (inches)	26¾	23¼	20¼	17 1/32	16 9/16	25⅛	18¼
Depth (inches)	14⅜	12 1/16	12 9/16	8 15/16	9 3/32	13¼	8 13/16
Net Weight (pounds)	52	46	52	19	22	51½	20½
Shipping Weight (pounds)	61	59½	66	23½	26	67½	25

Chassis Base Dimensions (86E, 86K, 86K7, 87K) ..... 14⅞ inches x 9¾ inches x 3¼ inches
Over-all Chassis Height ..... 9½ inches
Chassis Base Dimensions (86T, 86T1, 87T) ..... 15¼ inches x 6½ inches x 2¾ inches
Over-all Chassis Height ..... 9 inches
Operating Controls ..... (1) Power Switch—Tone; (2) Tuning (large inner knob), Range Selector (small outer knob, left to right "A", "B", "C"); (3) Volume
Tuning Drive Ratio ..... 20 to 1

General Description

These receivers employ a conventional three-band superheterodyne circuit, the arrangement of which is shown by the Schematic Circuit Diagram. Models 87K, 86K, and 86K7 are console models, each employing a 12-inch electrodynamic loudspeaker. Models 87T, 86T, and 86T1 are chest-type table models, each employing a 6-inch electrodynamic loudspeaker. Model 86E is an arm-chair model with the chassis mounted vertically to afford operation from the top, and includes a 12-inch electrodynamic loudspeaker. Models 87K and 87T incorporate a "Magic-Eye" tuning indicator.

The extensive tuning range afforded by the three tuning bands includes the "Standard broadcast" band and the im-

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REPLACEMENT PARTS—(Continued)

STOCK No.	DESCRIPTION
14387	Escutcheon—Tuning tube escutcheon for Models 87K and 87T only
11982	Fastener—Station selector dial scale fastener
30085	Gear—Indicator drive gear and hub assembly and indicator pointer stem and gear
14341	Idler—Station selector drive belt idler
14344	Indicator—Station selector indicator pointer
14382	Indicator—Vernier indicator pointer
5226	Lamp—Dial lamp
14340	Pulley—Station selector drive belt pulley and knob shaft
14361	Reflector—Dial reflector and lamp bracket assembly for Models 86E, 86K, 86K7, 86T, and 86T1 only
14362	Reflector—Dial reflector, lamp bracket and tuning tube bracket assembly for Models 87K and 87T only
14343	Retainer—Drive shaft and pulley retainer—holds tuning-knob shaft and pulley on range-switch shaft
11298	Resistor—5,600 Ohms, Carbon type, 1 Watt (R4)
11726	Resistor—6,800 Ohms, Carbon type, ½ Watt (R2)
5114	Resistor—15,000 Ohms, Carbon type, 1 Watt (R5)
14078	Resistor—18,000 Ohms, Carbon type, 1 Watt (R20), for Models 87K and 87T only
14284	Resistor—22,000 Ohms, Carbon type, 1/10 watt (R7)
11400	Resistor—27,000 Ohms, Carbon type, ½ Watt (R10), for Models 86E, 86K, 86K7, and 87K only
14390	Resistor—27,000 Ohms, Carbon type, 1/10 Watt (R10), for Models 86T, 86T1, and 87T only
13735	Resistor—33,000 Ohms, Carbon type, ½ Watt (R1)
11365	Resistor—82,000 Ohms, Carbon type, ½ Watt (R13)
5145	Resistor—100,000 Ohms, Carbon type, ½ Watt (R11)
11398	Resistor—220,000 Ohms, Carbon type, 1/10 Watt (R8)
11453	Resistor—270,000 Ohms, Carbon type, 1/10 Watt (R12)
13005	Resistor—390,000 Ohms, Carbon type, 1/10 Watt (R14)
11452	Resistor—470,000 Ohms, Carbon type, 1/10 Watt (R3)
12013	Resistor—1 Megohm, Carbon type, 1/10 Watt (R19), for Models 87K and 87T only
11626	Resistor—2.2 Megohm, Carbon type, ½ Watt (R6, R18) (R18 used in Models 87K and 87T only)
12004	Resistor—Voltage divider resistor—comprising one 216-ohm, one 27-ohm, and one 22-ohm sections (R15, R16, R17)
14350	Screw—No. 8-32 x 3/16 square-head set-screw for gear, Stock No. 30085, and drum, Stock No. 14345, and arm, Stock No. 14380
14374	Shield—Antenna coil shield
12008	Shield—First or Second I-F transformer shield
14375	Shield—Oscillator coil shield
14114	Socket—Dial lamp socket
11195	Socket—5-contact 5W4 Radiotron socket
11196	Socket—8-contact 6A8, 6K7, 6H6, 6F5, or 6F6 Radiotron socket
12007	Spring—Retaining spring for core, Stock Nos. 12006 and 12800
12907	Spring—Tension spring for indicator drive gear, Stock No. 30085
14342	Spring—Tension spring for idler, Stock No. 14341
14370	Switch—Range switch (S1, S2)
14371	Switch—Tone control switch and power switch (S3, S4)
14376	Transformer—First I-F transformer (L11, L12, C15, C16)
14283	Transformer—Second I-F transformer (L13, L14, C20, C21, C22, R7, R8)
14367	Transformer—Power transformer, 105-125 volts, 50-60 cycles (T1)
14368	Transformer—Power transformer, 105-125 volts, 25-60 cycles (T1)
14369	Transtormer—Power transformer, 105-125/210-250 volts, 50-60 cycles (T1)
13838	Trap—Wave trap, complete (L18, C1)
14335	Volume Control (R9)
14379	Washer—Felt washer for indicator pointer
	REPRODUCER ASSEMBLIES Models 86T, 86T1, and 87T
14616	Coil—Field coil (L17) (for speaker marked 84001-3)
14614	Cone—Reproducer cone (L15) (for speaker marked 84001-3)
14934	Cone—Reproducer cone (L15) (for speaker marked 84001-6)
5118	Plug—3-contact male plug for reproducer
14613	Reproducer—Complete
14615	Transformer—Output transformer (T2) (for speaker marked 84001-3)
14935	Transformer—Output transformer (T2) (for speaker marked 84001-6)
	REPRODUCER ASSEMBLIES Models 86E, 86K, 86K7, and 87K (RL-70E-1)
13866	Cap—Dust cap for cone center
14354	Coil—Field coil (L17)
11469	Coil—Hum neutralizing coil (L16)
12667	Cone—Reproducer cone and dust cap (L15)
5118	Plug—3-contact male plug for reproducer
14395	Reproducer—Reproducer complete
14358	Screw—Screw, washer, and lockwasher to hold core in yoke
14355	Transformer—Output transformer (T2)
14357	Washer—Spring washer to hold field coil
	MISCELLANEOUS ASSEMBLIES
14396	Escutcheon—Station selector escutcheon and crystal
14359	Knob—Station selector knob
14269	Knob—Volume control, tone control or range switch knob
4560	Screw—Chassis mounting screw and washer assembly—(Model 86E only)
11210	Screw—Chassis mounting screw and washer assembly—(Models 86K, 86K7 and 87K only)
11377	Screw—Chassis mounting screw and washer assembly—(Models 86T, 86T1 or 87T only)
4982	Spring—Retaining spring for knob—Stock No. 14359
14270	Spring—Retaining spring for knob—Stock No. 14269

portant short-wave international broadcast bands of 49, 31, 25, 19, 16, and 13 meters along with channels assigned for police, aviation, and amateur communication.

Features of design include magnetite core i-f transformers and low-frequency oscillator tracking; antenna wave trap; full automatic volume control; phonograph terminal board; aural-compensated audio volume control; two-point, high-frequency tone control; dust-proof electrodynamic loudspeaker; "Magic-Eye" tuning tube on 87K and 87T only; and a new sunburst dial with band indicator and short-wave stations listed by name.

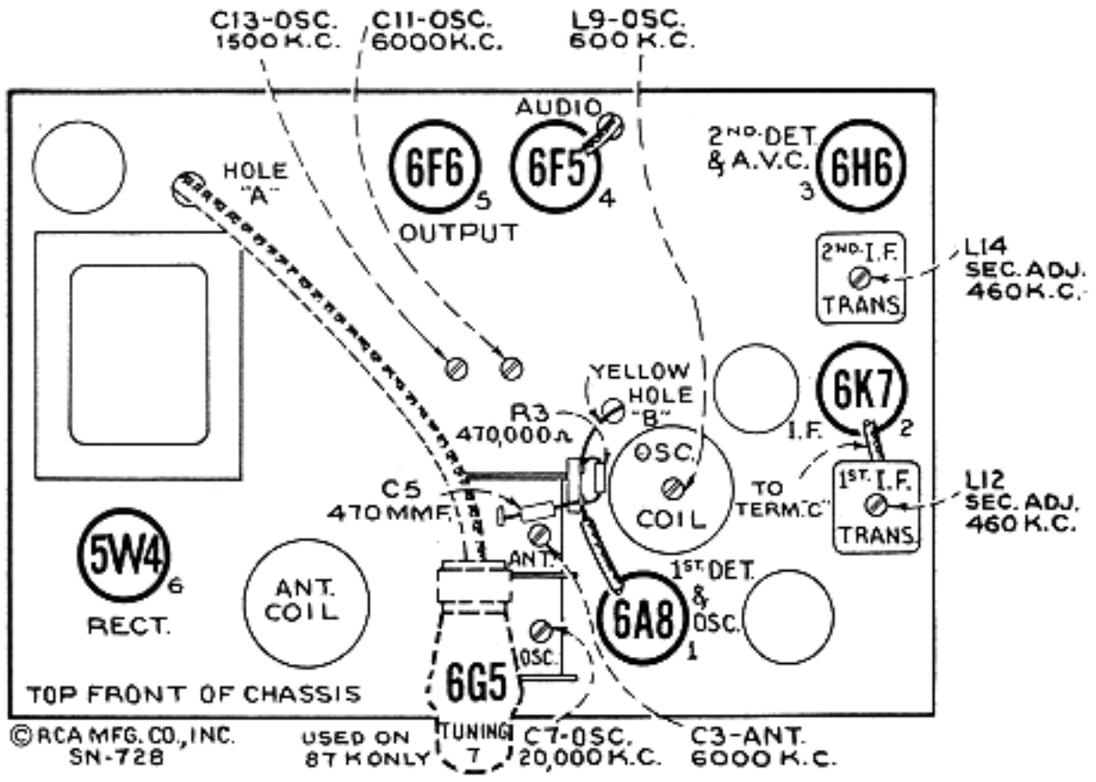


Figure 1—Radiotron, Coil, and Trimmer Locations (Models 86E, 86K, 86K7, and 87K)

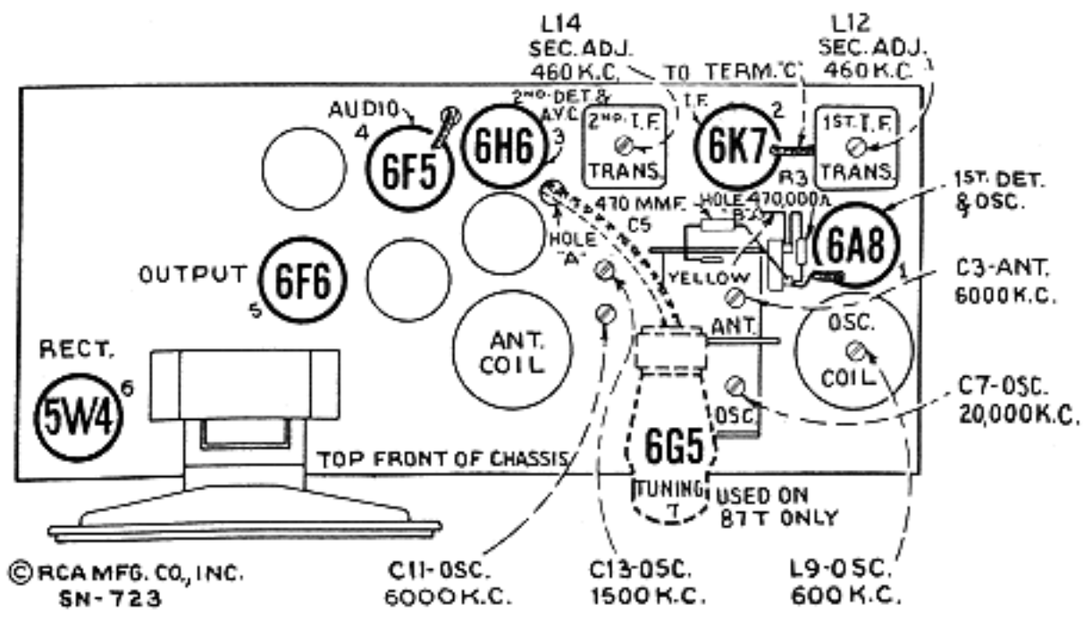


Figure 2—Radiotron, Coil, and Trimmer Locations (Models 86T, 86T1, and 87T)

Alignment Procedure

Calibrate the tuning dial by adjusting main dial pointer to the low-frequency (end) calibration mark on dial with the gang tuning-condenser plates in full-mesh position; then adjust the small (vernier) pointer to "O." These are friction adjustments.

Perform alignment in proper order, tabulated below, starting with No. 1 and following all operations across, then No. 2, etc. Adjustment locations are shown on figures 1, 2, 3, and 4.

Cathode-ray alignment is highly preferable; the connections to the chassis are shown on figures 6, 7, and 8. If an output indicator is used, connect it across the loudspeaker voice-coil and advance the receiver volume control to full-volume position.

Connect the "low" output terminal of the test oscillator to the receiver "G" (ground) terminal for all alignment operations. Regulate the output of the test oscillator so that minimum signal is applied to the receiver to obtain an observable output indication. This will avoid a-v-c action.

The term "Dummy antenna" means the device which must be connected between the "high" test-oscillator output and the point of connection to the receiver in order to obtain ideal alignment. "No signal, 550-750 kc" means that the receiver should be tuned to a point between 550 and 750 kc where no signal or interference is received from a station or local (heterodyne) oscillator.

For further details on alignment, refer to booklet "RCA Victor Receiver Alignment."

Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols	Adjust to Obtain
	Connection to Receiver	Dummy Antenna	Frequency Setting					
1	6K7 I-F Grid Cap	.001 Mfd.	460 kc	"A" Left	No Signal 550-750 kc	2nd I-F Trans.	L13 and L14	Max. (peak)
2	6A8 Det. Grid Cap	.001 Mfd.	460 kc	"A"	No Signal 550-750 kc	1st I-F Trans.	L11 and L12	Max. (peak)
3	Ant. Term.	300 Ohms	20,000 kc	"C" Right	20,000 kc	"C" Osc.	C7	Max. (peak)*‡
4	Ant. Term.	300 Ohms	6,000 kc	"B" Center	6,000 kc	"B" Osc.	C11	Max. (peak)*
5	Ant. Term.	300 Ohms	6,000 kc	"B"	6,000 kc	"B" Ant.	C3	Max. (peak)
6	Ant. Term.	200 Mmfd.	600 kc	"A" Left	600 kc	"A" L-F Osc.	L9	Max. (peak)
7	Ant. Term.	200 Mmfd.	1,500 kc	"A"	1,500 kc	"A" H-F Osc.	C13	Max. (peak)
8	Ant. Term.	200 Mmfd.	600 kc	"A"	600 kc	"A" L-F Osc.	L9	Max. (peak)
9	Ant. Term.	200 Mmfd.	1,500 kc	"A"	1,500 kc	"A" H-F Osc.	C13	Max. (peak)

* Use minimum capacity peak if two peaks can be obtained.
‡ After this adjustment, check for image signal by shifting receiver dial to 19,080 kc.

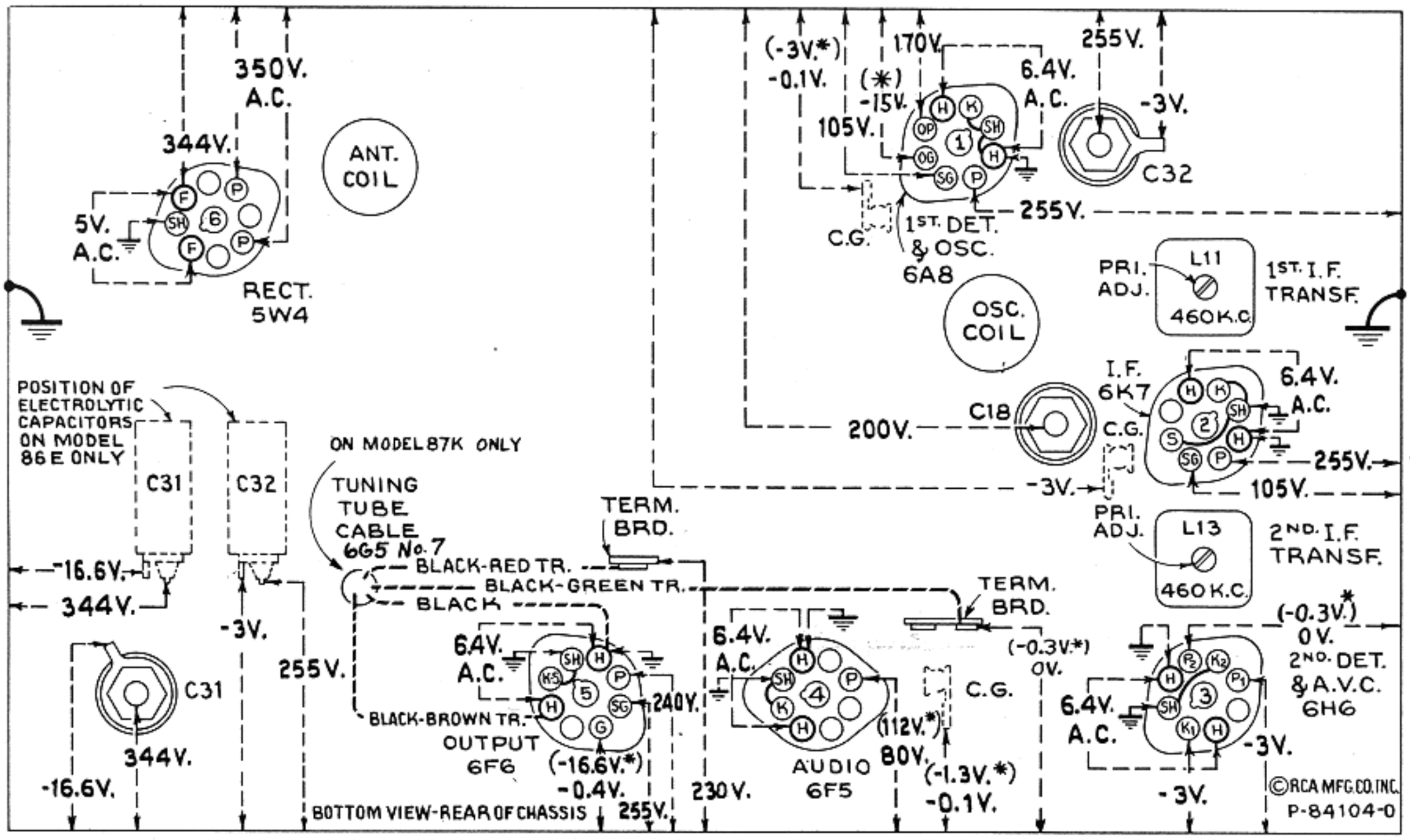


Figure 3—Radiotron Socket Voltages, Coil, and Trimmer Locations (Models 86E, 86K, 86K7, and 87K)

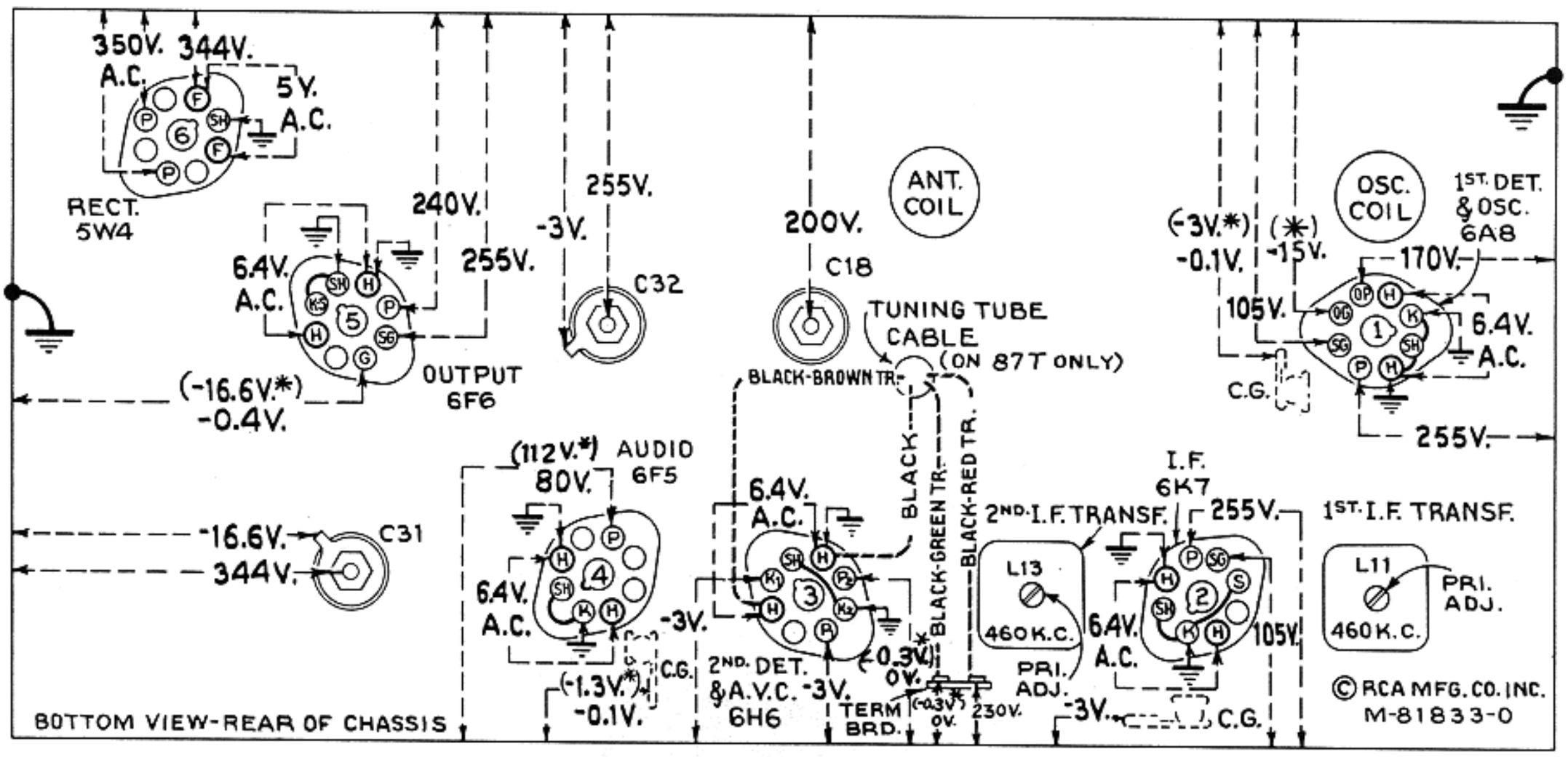
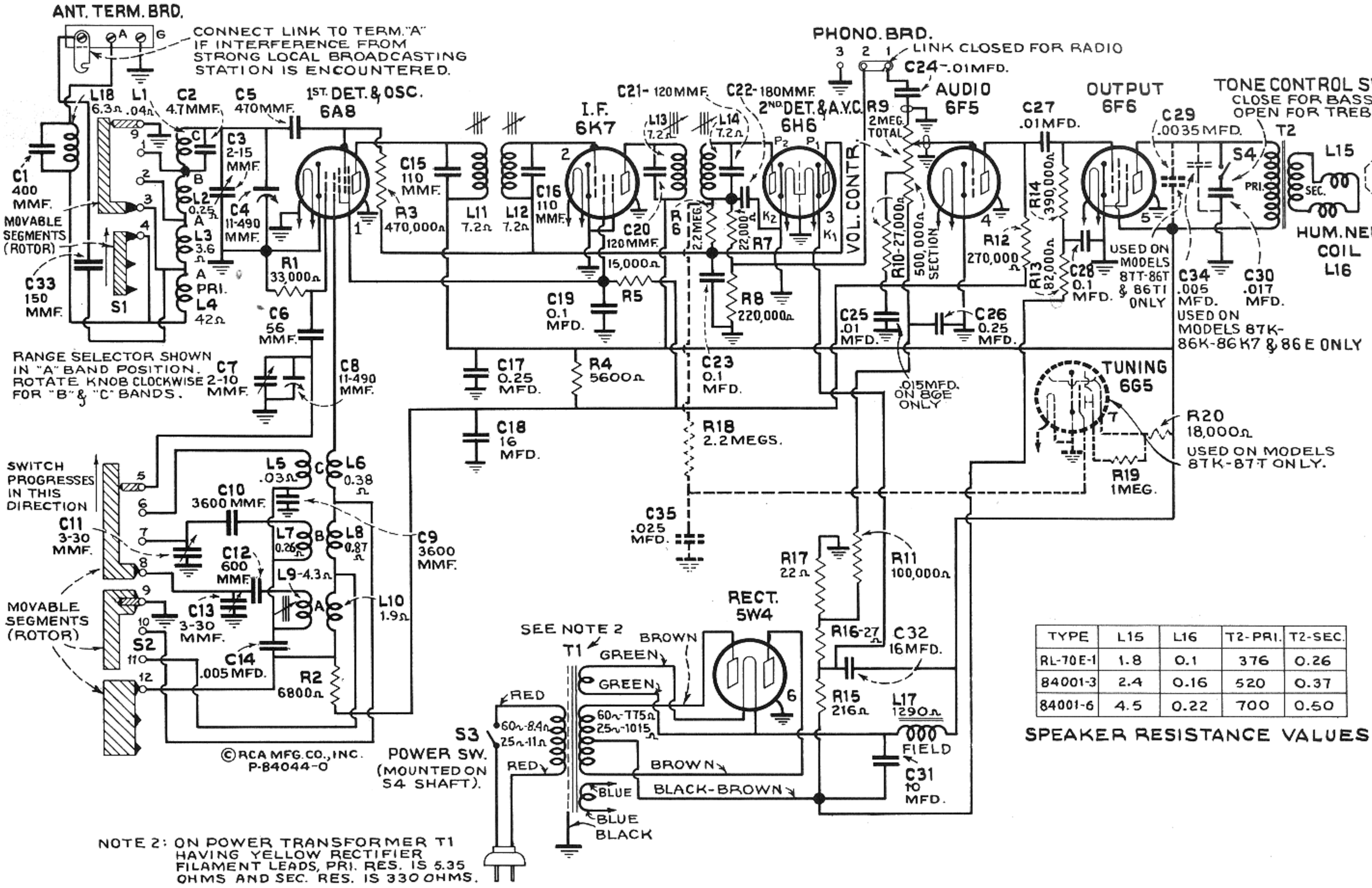


Figure 4—Radiotron Socket Voltages, Coil, and Trimmer Locations (Models 86T, 86T1, and 87T)

Measured at 115 volts, 60-cycle supply—Tuned to approximately 1,000 kc ("Standard Broadcast")—No signal being received—Volume control minimum

***Note:** Two voltage values are shown for some readings. The value shown in parentheses 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 parentheses because of the additional loading of the voltmeter through the high series circuit resistance.*

Voltage values as specified should hold within ±20% when the receiver is normally operative at its rated line voltage. 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, and 500 volts. Use the nearest range above the specified measured voltage. A-c voltages were measured with a corresponding a-c meter.



TYPE	L15	L16	T2-PRI.	T2-SEC.
RL-70E-1	1.8	0.1	376	0.26
84001-3	2.4	0.16	520	0.37
84001-6	4.5	0.22	700	0.50

SPEAKER RESISTANCE VALUES

NOTE 2: ON POWER TRANSFORMER T1 HAVING YELLOW RECTIFIER FILAMENT LEADS, PRI. RES. IS 5.35 OHMS AND SEC. RES. IS 330 OHMS.

Figure 5—Schematic Circuit Diagram

(On some instruments, R3 is connected to the junction of R18 and C35)

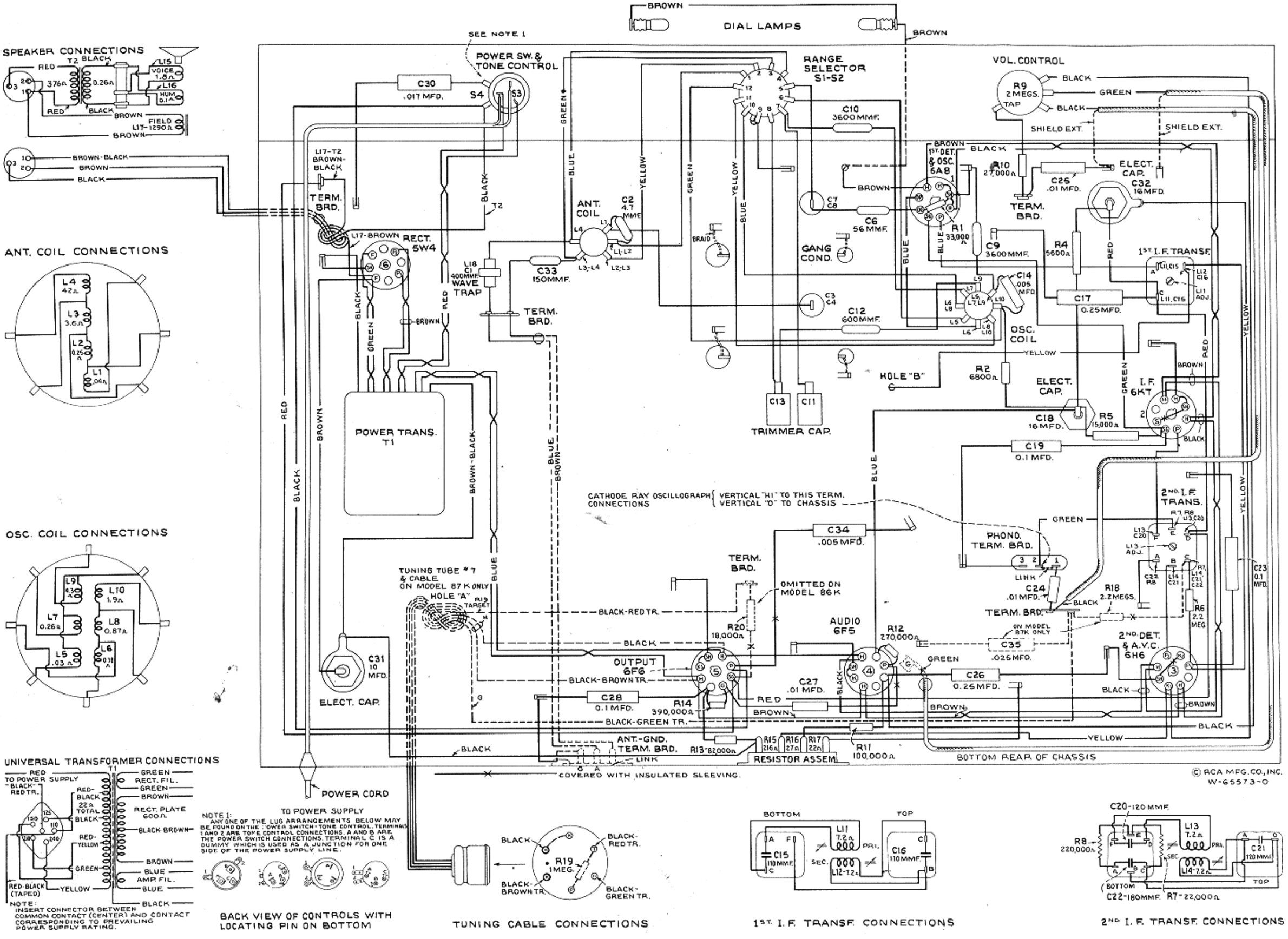


Figure 6—Chassis Wiring Diagram (Models 86K, 86K7, and 87K)

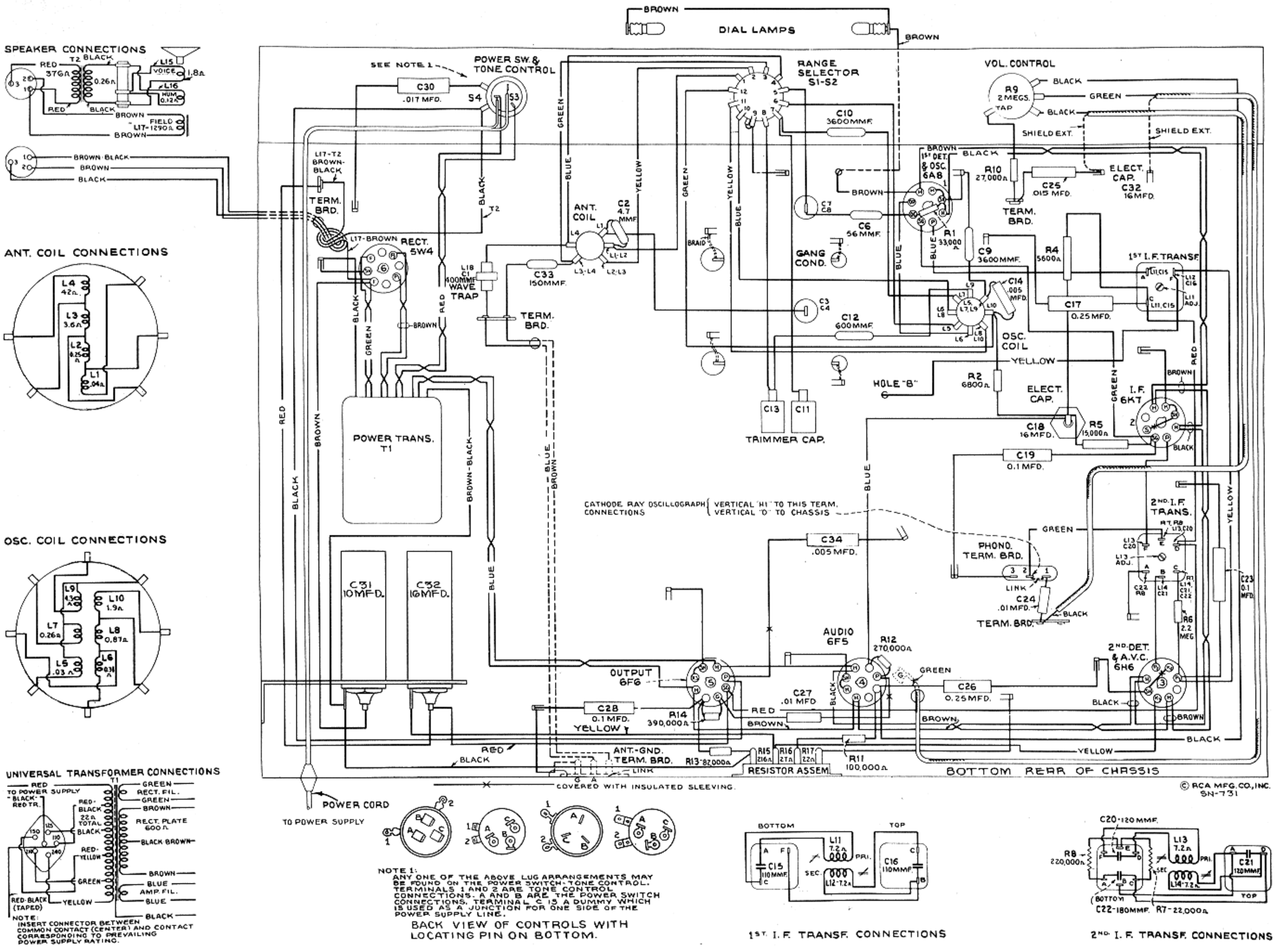


Figure 7—Chassis Wiring Diagram (Model 86E)

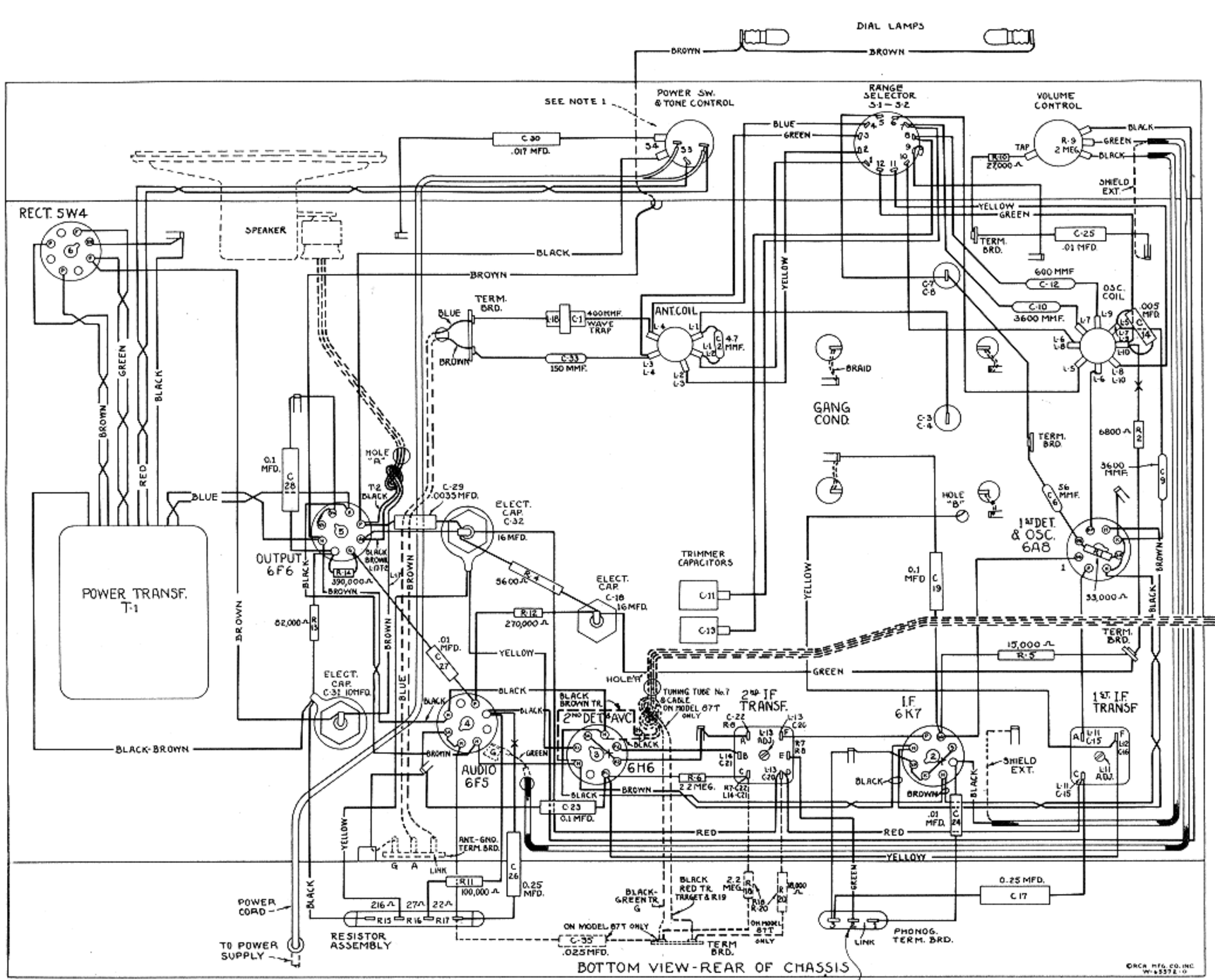
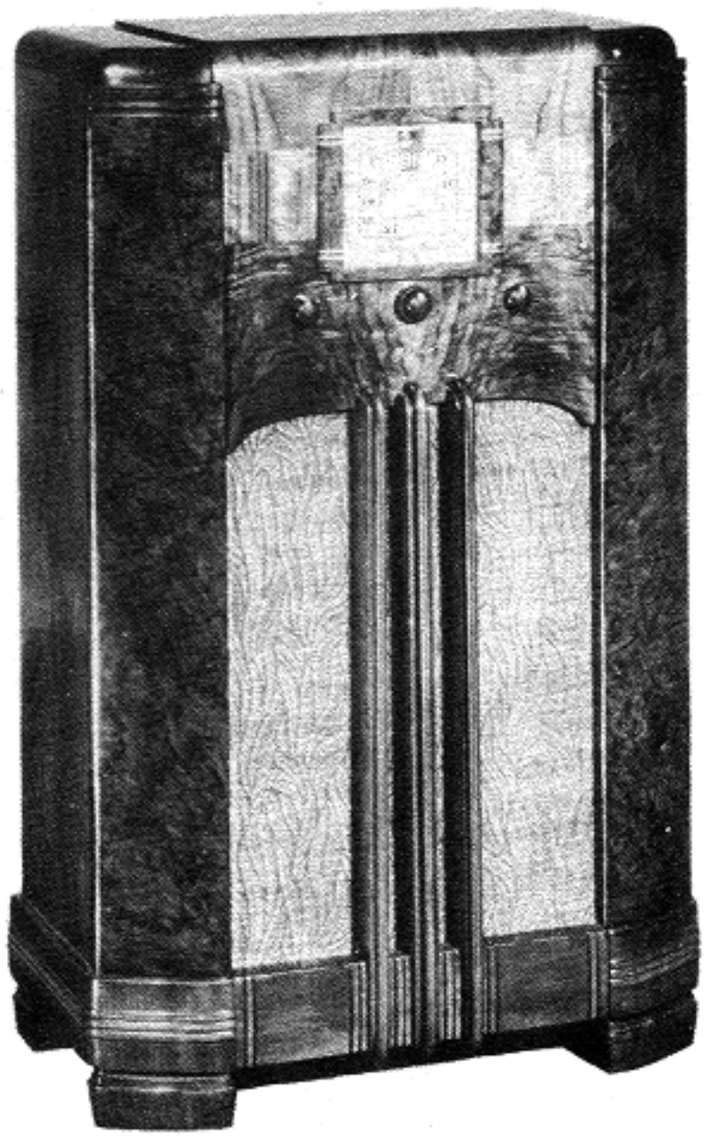
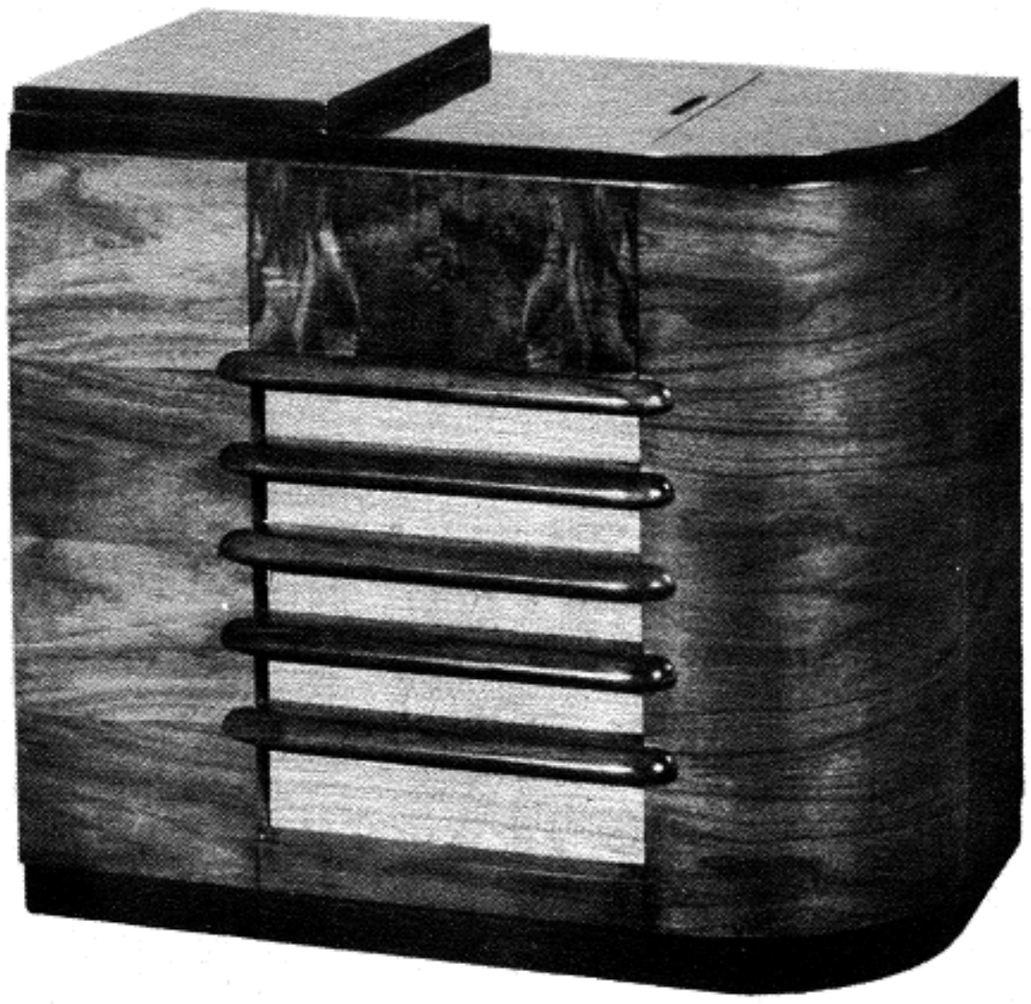


Figure 8—Chassis Wiring Diagram (Models 86T, 86T1, and 87T)

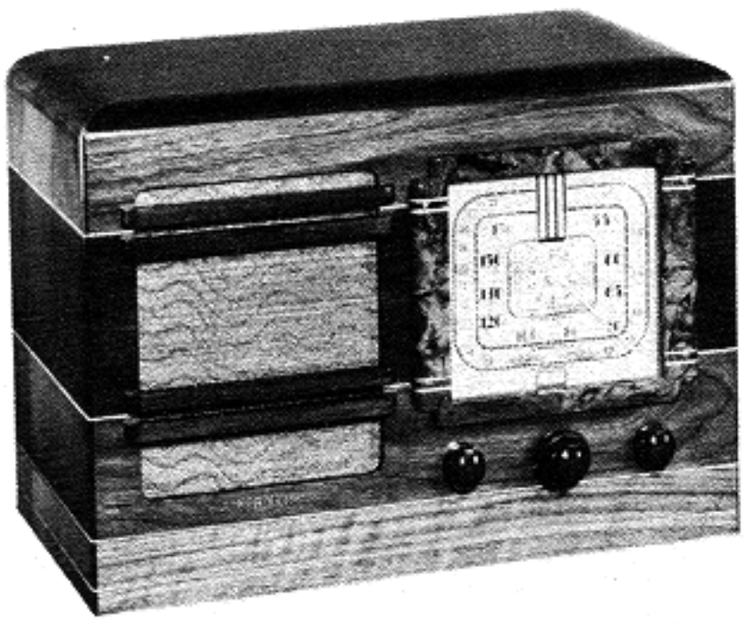
86E, 86K, 86K7, 86T, 86T1
87K, 87T



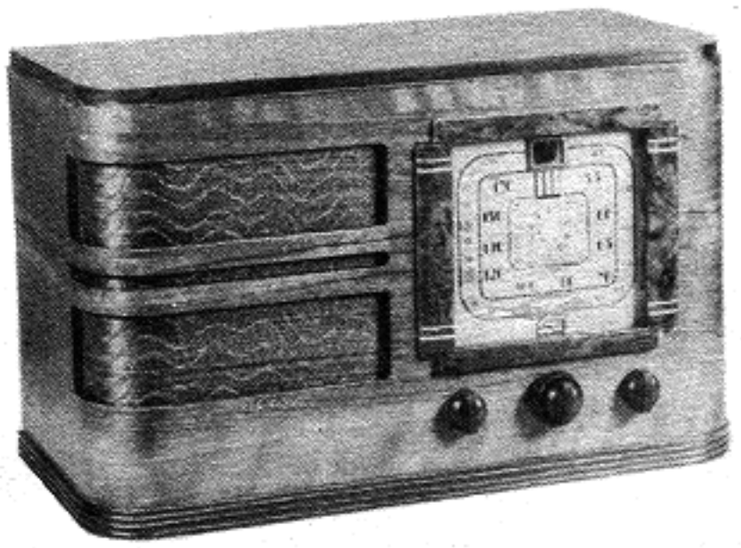
Model 87K



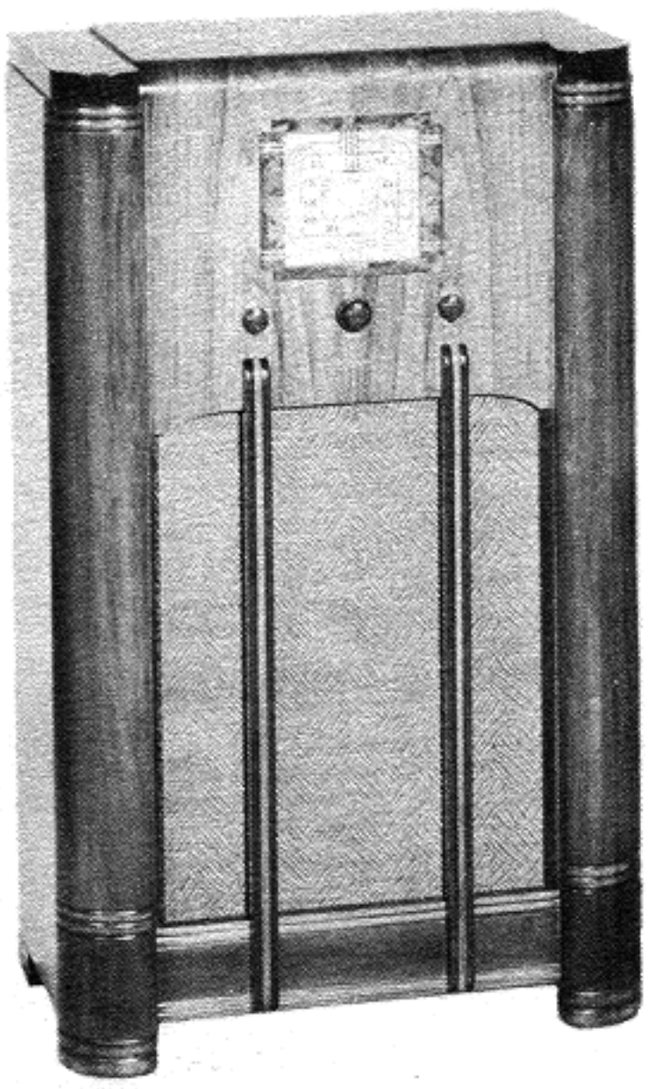
Model 86E



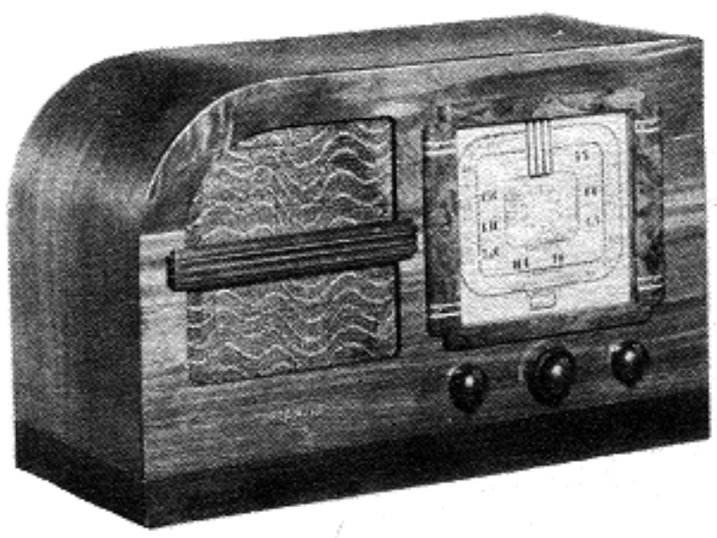
Model 86T1



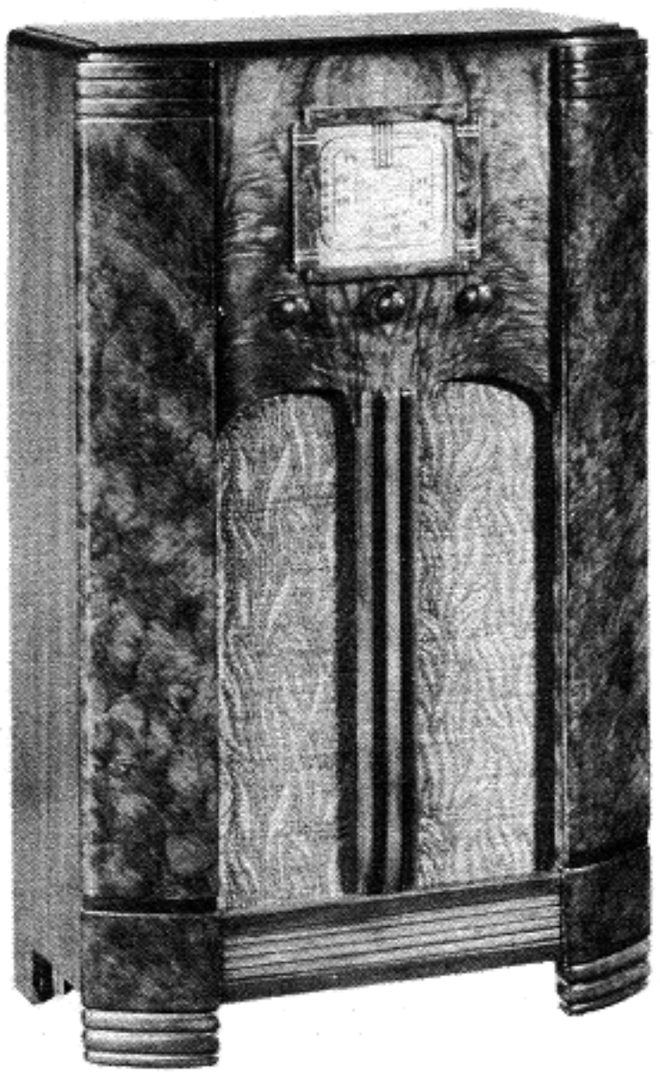
Model 87T



Model 86K7



Model 86T



Model 86K

Service Data

The various diagrams of this booklet contain such information as will be needed to isolate causes for defective operation if such develops. The ratings of the resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. Identification titles such R1, L1, C1, etc., provide reference between the illustrations and Replacement Parts List. The coils, transformer windings, and reactors are rated in terms of d-c resistance to permit continuity checks.

Loudspeaker.—Centering of the loudspeaker is made in the usual manner with three narrow paper feelers after first removing the front dust cover. This may be removed by softening its cement with a light application of acetone, using care not to allow the acetone to flow into the air gap. The dust cover should be cemented back in place with ambroid upon completion of adjustment.

Phonograph Attachment.—A terminal board is provided for connecting a phonograph into the audio amplifying circuit. RCA Victor Models R-93, R-93-A, R-93-2, or R-94 Record Players should be connected as follows: Remove link between terminals 1 and 2 on terminal board. Connect green wire in Radio-Record switch cable to terminal 1, yellow to terminal 2, and shield extension to terminal 3. Tape unused red and blue leads separately. Connect a 2-conductor twisted cable between the Record Player binding posts and the screw terminals on Radio-Record switch.

Precautionary Lead Dress (Models 86E, 86K, 86K7, 87K).—(1) Keep bus lead from term. 9 of S1-S2 to ground lance as short as possible. (2) Bus lead from term. 6 of S1-S2 to L5 should be 4 inches long. (3) Bus lead from term. 5 of S1-S2 to C7-C8 should be 2⅛ inches long. (4) Keep bus lead from term. 1 of S1-S2 to L1-L2 as short as possible. (5) Bus lead from L1 to C3-C4 should be 3¾ inches long. (6) Keep C6, C9, C10, and C12 so that broad side is perpendicular to chassis and keep their leads as short as possible. (7) Keep blue lead from "OP" of tube 1 to L6 dressed away from chassis and other leads. (8) Yellow and green leads from terms. 11 and 12 of S1-S2 to oscillator coil must be twisted and dressed under all range switch bus leads. (9) Keep green lead from term. E of 2nd i-f trans. to term. 2 of phono. board as short as possible.

Precautionary Lead Dress (Models 86T, 86T1, 87T).—(1) Keep bus lead from term. 9 of S1-S2 to ground lance as short as possible. (2) Bus lead from term. 6 of S1-S2 to L5 should be 3¼ inches long. (3) Bus lead from term. 5 of S1-S2 to C7-C8 should be 2¼ inches long. (4) Keep bus lead from term. 1 of S1-S2 to L1-L2 as short as possible. (5) Bus lead from L1 to C3-C4 should be 3¼ inches long and dressed above bus lead from antenna coil to range switch. (6) Keep C6, C9, C10, and C12 so that broad side in perpendicular to chassis and keep their leads as short as possible. (7) Power cord should be dressed over C27 and under bus from C32 to "SG" of tube 5. (8) C26 from dummy term. of tube 4 must be grounded to end lug of R-17. (9) Keep green lead from term. E of 2nd i-f trans. to term. 2 of phono. board as short as possible. (10) Keep bus lead from term. 10 of S1-S2 to L6-L8 as short as possible. When necessary to replace bus leads, use only wire having same diameter as original.

Radiotron Cathode Current Readings

Measured with Milliammeter Connected at Tube Socket Cathode Terminals Under Conditions Similar to Those of Voltage Measurements

(1)	RCA-6A8—1st Det.—Osc.....	14.	ma.
(2)	RCA-6K7—I-F Amp.....	8.5	ma.
(3)	RCA-6H6—2nd Det. and A.V.C.....	.....	
(4)	RCA-6F5—Audio Driver.....	0.26	ma.
(5)	RCA-6F6—Power Amplifier.....	37.	ma.
(6)	RCA-5W4—Rectifier	63.	ma.**
(7)	RCA-6G5—Tuning Tube	1.2	ma.

** Cannot be measured at socket.

REPLACEMENT PARTS

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

STOCK No.	DESCRIPTION
	RECEIVER ASSEMBLIES
14380	Arm—Band indicator operating arm and hub—less set screw, Stock No. 14350
12038	Band—Rubber band for tuning tube
14384	Belt—Variable condenser drive belt for Models 86E, 86K, 86K7, and 87K only
14388	Belt—Variable condenser drive belt for Models 86T, 86T1, and 87T only
14378	Board—Antenna and ground terminal board
12717	Board—Phonograph terminal board
14338	Bushing—Variable condenser mounting bushing and screw assembly
14394	Cable—Tuning tube cable and socket, complete, for Models 87T and 87K only
12607	Cap—First I.F. transformer shield top
12581	Cap—Second I.F. transformer shield top
11350	Cap—Grid contact cap
14383	Capacitor—Adjustable dual trimmer (C11, C13)
14392	Capacitor—4.7 Mmfd. (C2)
12723	Capacitor—56 Mmfd. (C6)
14262	Capacitor—110 Mmfd. (C15, C16)
12404	Capacitor—120 Mmfd. (C20, C21)
12725	Capacitor—150 Mmfd. (C33)
12406	Capacitor—180 Mmfd. (C22)
13052	Capacitor—470 Mmfd. (C5)
14391	Capacitor—600 Mmfd. (C12)
12811	Capacitor—3,600 Mmfd. (C9, C10)
5005	Capacitor—.0035 Mfd. (C29) (Used in Models 86T, 86T1, and 87T only)
4838	Capacitor—.005 Mfd. (C34) (Used in Models 86E, 86K, 86K7 and 87K only)
4868	Capacitor—.005 Mfd. (C14)
13138	Capacitor—.01 Mfd. (C27)
14393	Capacitor—.01 Mfd. (C24, C25) (C25, .01 Mfd. used in Models 86K, 86K7, 86T, 86T1, 87K, and 87T only)
11315	Capacitor—.015 Mfd. (C25) (for Model 86E only)
11451	Capacitor—.017 Mfd. (C30)
4870	Capacitor—.025 Mfd. (C35) (Used in Models 87K and 87T only)
4841	Capacitor—0.1 Mfd. (C19, C23, C28)
4840	Capacitor—0.25 Mfd. (C26)
5170	Capacitor—0.25 Mfd. (C17)
11240	Capacitor—10 Mfd. (C31)
5212	Capacitor—16 Mfd. (C32)
14377	Capacitor—16 Mfd. (C18) (Models 86K, 86K7, 86T, 86T1, 87K, and 87T only)
30105	Capacitor—16 Mfd. (C18) (Model 86E only)
14372	Coil—Antenna coil and shield (L1, L2, L3, L4)
14373	Coil—Oscillator coil and shield (L5, L6, L7, L8, L9, L10)
14363	Condenser—2-gang variable tuning condenser (C3, C4, C7, C8)
5119	Connector—3-contact female connector for reproducer cable
12800	Core—Adjustable core and stud assembly for coil, Stock No. 14373
12006	Core—Adjustable core and stud for Stock Nos. 14376 and 14283
14385	Dial—Band indicator dial and mounting bracket assembly for Models 86K, 86K7, and 87K only
30106	Dial—Band indicator dial and mounting bracket assembly for Model 86E only
14389	Dial—Band indicator dial and mounting bracket assembly for Models 86T, 86T1, and 87T only
14381	Dial—Station selector dial scale for Models 86E, 86K, 86K7, 86T, and 86T1 only
14386	Dial—Station selector dial, complete, with tuning tube escutcheon assembly for Models 87K and 87T only
14364	Drive—Variable condenser vernier drive pinion gear and shaft
14345	Drum—Variable condenser drive belt drum, complete, with set screws