MODELS F-6B & F-6CB

Six-Tube, Three-Band, Battery-Operated Superheterodyne Receivers

Electrical Specifications

FREQUENCY RANGES

"Standard 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., det., ant.)
"Medium Wave" (B)	6,000 kc (osc.)
"Standard Broadcast" (A)	600 kc (osc.), 1,500 kc (osc.)

Intermediate Frequency ..... 460 kc

RADIOTRON COMPLEMENT

(1) Type 1A4	R-F Amplifier
(2) Type 1C6	First Detector—Oscillator
(3) Type 1A4	Intermediate Amplifier
(4) Type 1F6	Second Det., A-F Amp., and A.V.C.
(5) Type 30	Audio Driver
(6) Type 19	Push-Pull Power Output

Pilot Lamps (2) ..... Mazda 2.0 volts, .06 ampere

BATTERIES REQUIRED

"A", one plug-in, 2½-volt Air Cell, or one 2-volt storage battery; "B," three 45-volt, heavy-duty, plug-in type B batteries; "C," one 7½-volt C battery tapped at —1½, —3, and —4½ volts, and three bias cells (Stock No. 12681).

CURRENT CONSUMPTION

"A" at 2 volts (pilot lamps off)	0.62 ampere
"A" at 2 volts (pilot lamps on)	0.74 ampere
"B" at 135 volts	21 milliamperes
Fuse Rating	½ ampere

POWER OUTPUT

Undistorted	1.2 watts
Maximum	2.2 watts

LOUDSPEAKER

Type	Permanent-Magnet Dynamic
Voice Coil Impedance	2.2 ohms at 400 cycles

Mechanical Specifications

	MODEL F6CB	MODEL F6B
Height	39 5/16 inches	20¼ inches
Width	25¾ inches	15½ inches
Depth	12¼ inches	10 5/32 inches
Weight (net)	55 pounds	29 pounds
Weight (shipping)	70 pounds	36 pounds

Chassis Base Dimensions ..... 13½ inches x 7¾ inches x 3 inches

Over-all Height of Chassis ..... 9 inches

Operating Controls ..... (1) Volume; (2) Tuning (large inner knob) Range Selector (small outer knob); (3) Power Switch—tone

Tuning Drive Ratio ..... 20 to 1

General Description

Each of these receivers employs a similar chassis, the superheterodyne circuit arrangement of which is shown by figure 2. Model F6CB is a console model employing a 12-inch, permanent-magnet, dynamic loudspeaker while Model F6B is a table model employing an 8-inch, permanent-magnet, dynamic loudspeaker. Features of design include an r-f amplifier stage for high signal-to-noise ratio and high sensitivity: new, plunger-type, air trimmers; magnetite-core i-f transformers and low-frequency "A"-oscillator tracking; automatic volume control; aural-compensated audio volume control; resistance-coupled, first-audio stage and transformer-coupled, audio-driver stage to a push-pull, class-B, audio-output stage; phonograph terminal board; continuous high-frequency tone control; super-sensitive, permanent-magnet, dynamic loudspeaker with dust screen; low current drain; and a large, easy-to-read, illuminated dial with vernier pointer

and save-a-drain pilot lamp switch combined with the tuning control.

These receivers may be easily converted to 6-volt operation by employing a GE model "**100**" Powerunit which, with a 6-volt storage battery, replaces the "A" and "B" batteries listed under "Batteries required".

The three tuning ranges cover the "Standard broadcast" band and the important short-wave bands at 49, 31, 25, 19, 16, and 13 meters along with channels assigned for police, aviation, and amateur communication.

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 as 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.

Precautionary Lead Dress.—(1) Twisted leads from filament switch to power plug must be dressed against bottom of end shield and fastened with tape. (2) Lead from term. No. 6 of S3 to chassis must be as short as possible and to same chassis lance as C15-C34. (3) Keep lead from term. No. 9 of S3 to L7-L8 as short as possible. (4) Keep lead from L7 to C11 as short as possible. (5) Keep lead from C10 to C11 as short as possible. (6) Keep leads of C41 as short as possible. (7) Keep lead from term. No. 20 of S2 to C13 as short as possible.

Phonograph Attachment.—A terminal board is provided for connecting a phonograph into the audio amplifying circuit. The Model R-93 Record Player 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.

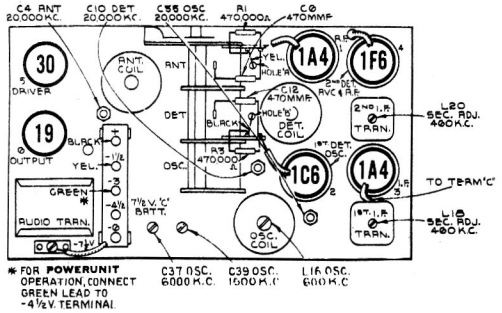


Figure 1—Radiotron, Coil, and Trimmer Locations

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 and 4.

Cathode-ray alignment is highly preferable; the connections to the chassis are shown on figure 3. 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.

Order of Alignment	Test Oscillator			Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols	Adjust to Obtain
	Connection to Receiver	Dummy Antenna	Frequency Setting				
1	1A4 I-F Grid Cap	.001 Mfd.	460 kc	No Signal 550-750 kc	2nd I-F Trans.	L19 and L20	Symmetrical Curve
2	1C6 Det. Grid Cap	.001 Mfd.	460 kc	No Signal 550-750 kc	1st I-F Trans.	L17 and L18	Symmetrical Curve
3	Ant. Term.	300 Ohms	20,000 kc	20,000 kc	"C" Osc.	C35	Max. (peak) *
4	Ant. Term.	300 Ohms	20,000 kc	20,000 kc	"C" Det.	C10	Max. (peak) †
5	Ant. Term.	300 Ohms	20,000 kc	20,000 kc	"C" Ant.	C4	Max. (peak) ‡
6	Ant. Term.	300 Ohms	6,000 kc	Rock Thru 6,000 kc	"B" Osc.	C37	Max. (peak) *
7	Ant. Term.	200 Mmfd.	600 kc	600 kc	"A" L-F Osc.	L16	Max. (peak)
8	Ant. Term.	200 Mmfd.	1,500 kc	1,500 kc	"A" H-F Osc.	C39	Max. (peak)
9	Ant. Term.	200 Mmfd.	600 kc	Rock Thru 600 kc	"A" L-F Osc.	L16	Max. (peak)
10	Ant. Term.	200 Mmfd.	1,500 kc	Rock Thru 1,500 kc	"A" H-F Osc.	C39	Max. (peak)

* Use minimum capacity peak if two peaks can be obtained.

† Use maximum capacity peak if two peaks can be obtained.

‡ After this adjustment, check for image signal by shifting receiver dial to 19,080 kc.

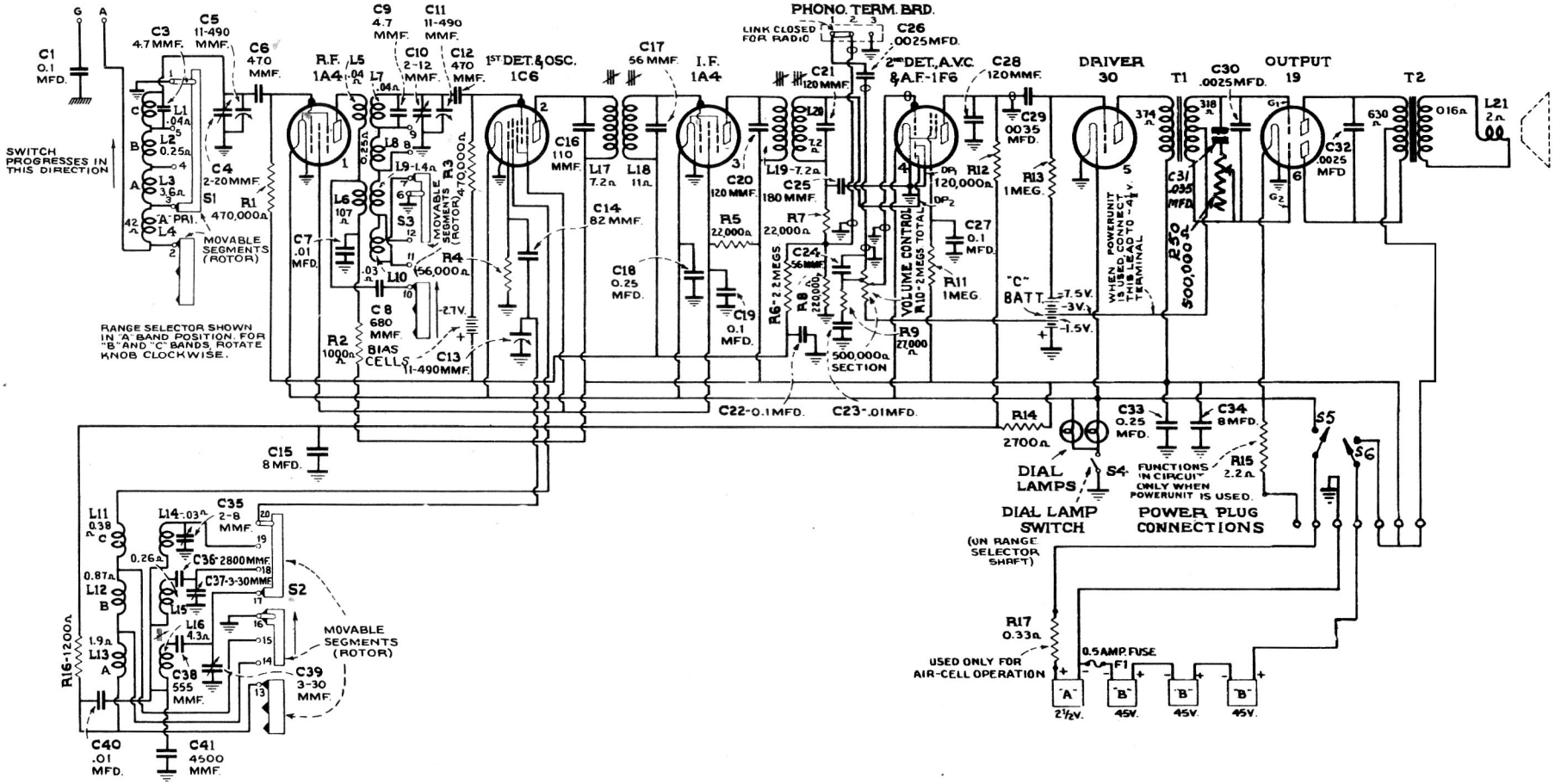


Figure 2—Schematic Circuit Diagram

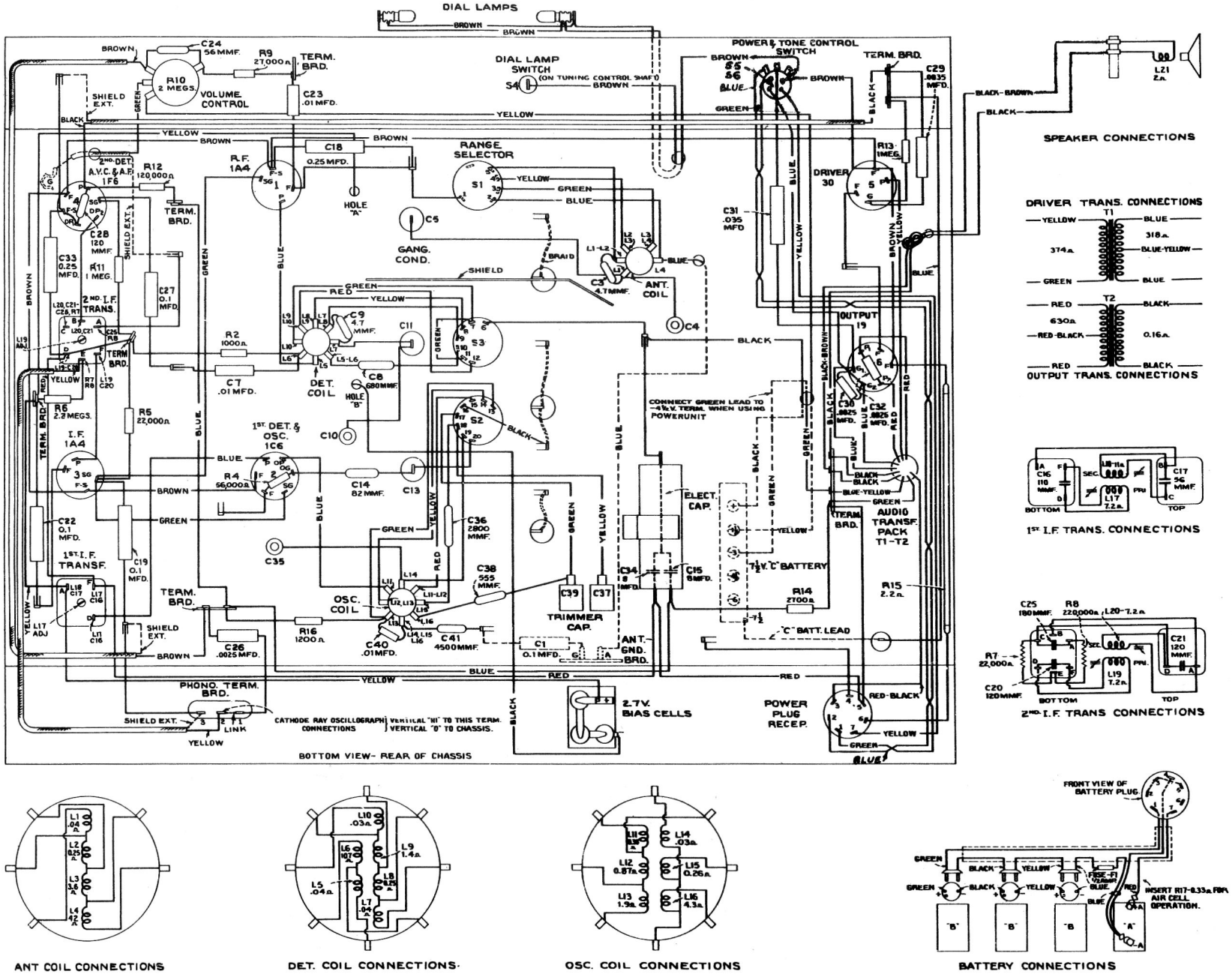
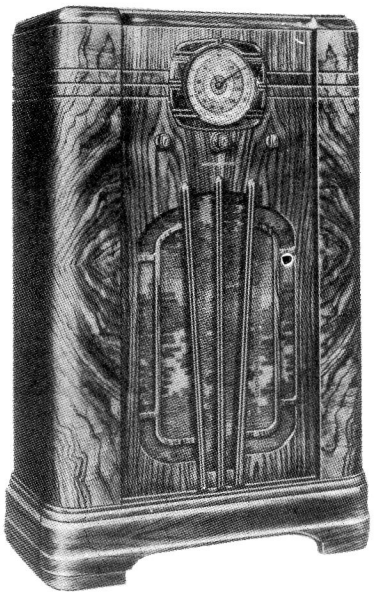
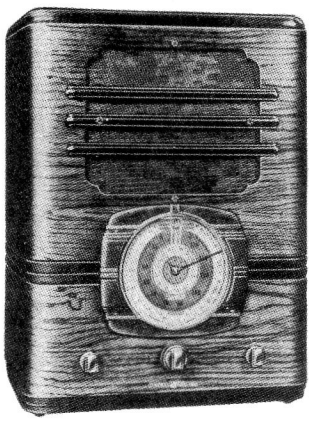


Figure 3—Chassis Wiring Diagram



MODEL F6CB

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.



MODEL F6B

Bias Cells.—Three bias cells are used only for the purpose of supplying bias potential to the 1C6 first-detector—oscillator tube. These cells should never be measured with an ordinary voltmeter or other device which draws any current. A simple check on these cells may be made by connecting a milliammeter in the plate circuit of the 1C6 tube and noting the plate current reading. Then carefully remove the cells and substitute a battery potential of 2.7 volts in their place and note the new reading on the milliammeter. If the first reading obtained (with bias cells) is more than 40% from the latter reading (with 2.7-volt battery), the bias cells should be replaced. This 40% difference is equivalent to a change of approximately 25% battery voltage.

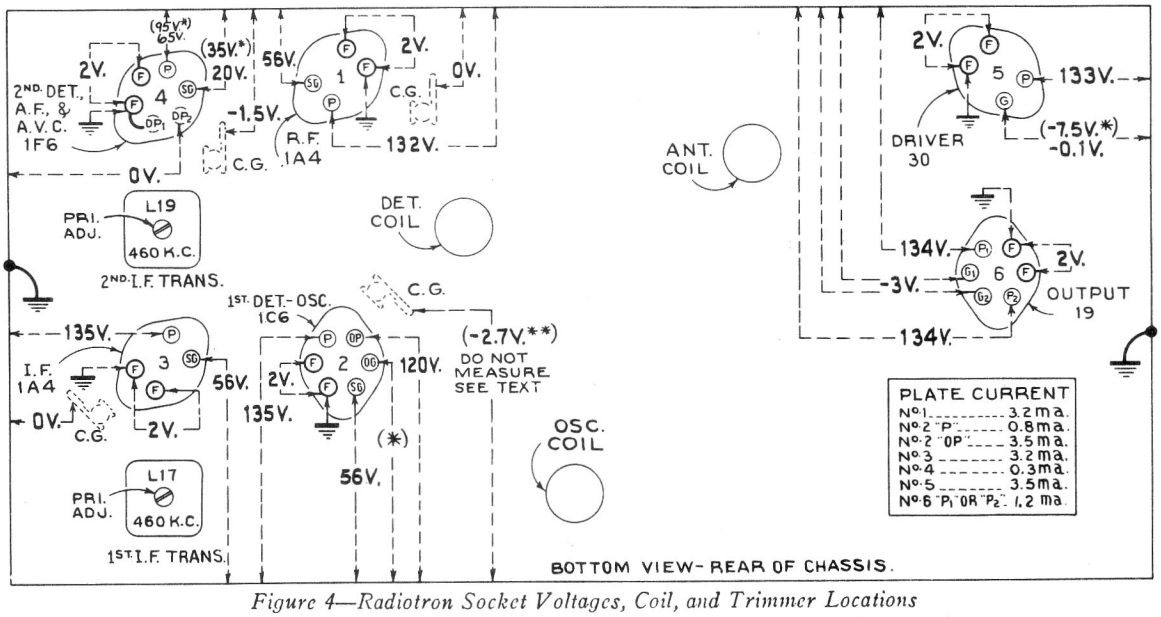


Figure 4—Radiotron Socket Voltages, Coil, and Trimmer Locations
Measured with all batteries at normal voltage—Tuned to approximately 1,000 kc—
No signal being received—Volume control minimum

***CAUTION: Do not attempt to measure voltage on control grid of the 1C6 with any conventional voltmeter due to presence of bias cells.*

Note: Two voltage values are shown for some readings. The higher value shown in parenthesis with asterisk (*) indicates operating conditions without voltmeter loading. The lower value is the actual measured voltage and differs from the higher value 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, and terminals to receiver chassis ground on figure 4 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 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 and 250 volts. Use the nearest range above the specified measured voltage.

Operation With "100" Power Unit—These receivers may readily be operated from a GE Model **"100"** Powerunit, in which case, a six-volt storage battery replaces the "A" and "B" batteries listed under "Batteries required." When using the **"100"** one cell (2 volts) of the storage battery supplies filament voltage to the tubes, while the other two cells (4 volts) supplies power for the **"100"**. When installing, the seven prong **"100"** receptacle plugs into the seven prong plug on the rear apron of the receiver chassis and the four battery leads clip on terminals of the storage battery as follows: Red to + 6 V.; Blue to + 4 V.; Yellow to + 4 V.; and brown (fused lead) to —V. The two four-volt leads (Blue and Yellow) should make separate connections to the same battery strap to avoid vibrator buzz which might otherwise result if these two leads are joined together or touch each other. Observe extreme care that proper connections are made to the battery, as a wrong connection will burn out the tubes. The green lead (originally connected to — 3 v. on the "C" battery) should be shifted to the — 4.5 volt tap. The other "C" battery connections remain unchanged.

The following changes under "Electrical specifications" become effective when employing the **"100"**; "A" battery current drain at 6 volts, 1.65 amperes. Fuse rating, 5 amperes. Undistorted output, 1.3 watts. Maximum output, 1.8 watts. Under "Service data," the following voltages apply to the Type-19 power-output tube. Either plate to chassis, 180 volts. Either grid to chassis,—4 ½ volts. Plate current (either plate), 1.6 ma.

When servicing, the **"100"** chassis should be insulated from the receiver chassis to avoid vibrator buzz.

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION
	RECEIVER ASSEMBLIES
14388	Belt-Variable condenser drive belt-Pkg. of 2.....
12717	Board-Phonograph terminal board.....
13216	Board-Antenna and ground terminal board.....
14338	Bushing-Variable condenser mounting bushing and screw assembly.....
12607	Cap-First I.F. transformer shield top.....
12581	Cap-Second I.F. transformer shield top.....
12118	Cap-Grid contact cap-Pkg. of 5.....
14392	Capacitor-4.7 Mmfd. (C3,C9).....
13307	Capacitor-56 Mmfd. (C17).....
12723	Capacitor-56 Mmfd. (C24).....
12813	Capacitor-82 Mmfd. (C14).....
14262	Capacitor-110 Mmfd. (C16).....
12724	Capacitor-120 Mmfd. (C28).....
12404	Capacitor-120 Mmfd. (C20,C21).....
12406	Capacitor-180 Mmfd. (C25).....
13052	Capacitor-470 Mmfd. (C6,C12).....
12727	Capacitor-555 Mmfd. (C38).....
14417	Capacitor-680 Mmfd. (C8).....
14407	Capacitor-2,800 Mmfd. (C36).....
12728	Capacitor-4,500 Mmfd. (C41).....
5005	Capacitor-.0035 Mfd. (C29).....
5107	Capacitor-.0025 Mfd. (C26,C30,C32).....
5196	Capacitor-.035 Mfd. (C31).....
13138	Capacitor-.01 Mfd. (C7,C23,C40).....
4791	Capacitor-0.1 Mfd. (C1,C19,C22,C27).....
4840	Capacitor-0.25 Mfd. (C18,C33).....
14383	Capacitor-Adjustable dual trimmer (C37,C39).....
12884	Capacitor-Adjustable trimmer (long)(C4).....
12714	Capacitor-Adjustable trimmer (medium)(C10).....
12807	Capacitor-Adjustable trimmer (short) (C35).....
14403	Capacitor-Pack comprising two sections each 8 Mfd. (C15,C34).....
12681	Cell-Bias cell.....
14372	Coil-Antenna coil and shield (L1,L2,L3,L4).....
14373	Coil-Oscillator coil and shield (L11,L12,L13,L14, L15,L16).....
14414	Coil-R.F. coil and shield (L5,L6,L7,L8,L9,L10)...
14411	Condenser-3-gang variable tuning condenser (C5, C11,C13).....
12006	Core-Adjustable core and stud for I.F.transformers
12800	Core-Adjustable core and stud assembly for oscillator coil.....
S-1786	Dial-Station selector dial scale.....
14412	Drive-Variable condenser vernier drive shaft and pinion gear.....
14345	Drum-Variable condenser drive belt drum complete with set screws.....
30085	Gear-Indicator drive gear and hub assembly and pointer stem and gear assembly.....
14405	Holder-Bias cell holder.....
14341	Idler-Station selector drive belt idler.....
S-1784	Indicator-Station selector indicator pointer.....
S-1785	Indicator-Vernier indicator pointer.....
4348	Lamp-Dial lamp.....
14404	Plug-7-contact male plug located on rear apron of chassis for battery cable.....
14340	Pulley-Station selector drive belt pulley and knob shaft.....
14361	Reflector-Dial reflector and lamp bracket assy...
14406	Resistor-2.2 ohms,flexible type,3 watt (R15).....
5112	Resistor-1,000 ohms,carbon type,¼ watt (R2).....
11283	Resistor-1,200 ohms,carbon type,¼ watt (R16).....
5144	Resistor-2,700 ohms,carbon type,¼ watt (R14).....
11305	Resistor-22,000 ohms,carbon type,¼ watt (R5).....
14284	Resistor-22,000 ohms,carbon type,1/10 watt (R7)..
14390	Resistor-27,000 ohms,carbon type,1/10 watt (R9)..
12286	Resistor-56,000 ohms,insulated,¼ watt (R4).....
13734	Resistor-120,000 ohms,carbon type,¼ watt (R12)...
11398	Resistor-220,000 ohms,carbon type,1/10 watt(R8)..
11452	Resistor-470,000 ohms,carbon type,1/10 watt(R1,R3)
13730	Resistor-1 megohm,carbon type,1/10 watt(R11,R13).
11626	Resistor-2.2 megohm,carbon type,¼ watt (R6).....
14350	Screw-No.8-32x3/16 square head set screw for gear Stock No.30085 and drum Stock No.14345 Pkg.of 10
12008	Shield I.F. transformer shield can.....
14374	Shield-R.F. or antenna coil shield.....
14375	Shield-Oscillator coil shield.....
3682	Shield-Radiotron shield.....
4794	Socket-4-contact 1A4 or 30 Radiotron socket.....
4786	Socket-6-contact 1C6,1F6 or 19 Radiotron socket..
14171	Socket-Dial lamp socket.....
12907	Spring-Tension spring for indicator drive gear Stock No. 30085 Pkg. of 10.....
14342	Spring-Tension spring for idler Stock No.14341 Pkg. of 10.....
12007	Spring-Retaining spring for core Stock No.12006 Pkg. of 10.....
14413	Switch-Range switch (S1,S2).....
S-1779	Switch-Tone control and power Switch (R50).....
14261	Transformer-First I.F. transformer(L17,L18,C16, C17).....
14283	Transformer-Second I.F. transformer (L19,L20,C20, C21,C25,R7,R8).....
12803	Transformer-Audio transformer pack (T1,T2).....
14379	Washer-Felt washer for indicator pointer-Pkg. of 10.....
14335	Volume Control (R10).....
	REPRODUCER ASSEMBLIES
	CONSOLE MODEL (Speaker No. RL71-1)
S-1787	Cone-Reproducer cone and dust cap (L21).....
S-1788	Reproducer-Complete.....
	TABLE MODEL (Speaker No. RL73-1)
S-1777	Cone-Reproducer cone and dust cap (L21).....
S-1776	Reproducer-Complete.....
	MISCELLANEOUS ASSEMBLIES
4289	Body-Fuse holder female body - Pkg. of 4.....
4286	Bushing-Fuse holder bushing and ferrule-Pkg.of 4.
S-1709	Cable-Battery cable complete with fuse,fuse holder,one 7-contact female connector,three 3-contact male connectors and two battery clips...
4288	Cap-Fuse holder male cap-Pkg. of 4.....
14289	Clip-Battery clips,one marked "+"and one unmarked
12827	Connector-2-contact male connector for battery cable.....
14409	Connector-7-contact female connector for battery cable.....
S-1781	Escutcheon-Station selector escutcheon and crystal
3748	Fuse-½ ampere (F1) Pkg. of 2.....
S-1783	Knob-Volume control, tone control or range switch knob.....
S-1782	Knob-Station selector knob.....
4290	Insulator-Fuse holder insulating sleeve-Pkg.of 5.
14418	Resistor-0.33 ohms flexible resistor-¼ watt, complete with clip (R17).....
4284	Spring-Fuse holder tension spring - Pkg. of 5....
4982	Spring-Retaining spring for knob Stock No.14359 Pkg. of 5.....
14270	Spring-Retaining spring for knob Stock No.14269 Pkg. of 5.....
4285	Washer-Fuse holder insulating washer-Pkg.of 10...

* NOTE:- When ordering reproducer assemblies, state whether or not reproducer is enclosed in a black dust bag.

When ordering Stock No. S-1756 (with black dust-bag) state whether it has a spider, or suspension bracket.