

MODEL G-7CB (BAND SPREAD)

Seven-Tube, Five-Band, Battery-Operated, Superheterodyne Receiver

Electrical Specifications

FREQUENCY RANGES

Standard Broadcast (A) 540-1,720 kc
"49 M" (49 Meters) 5,970-6,240 kc
"31 M" (31 Meters) 9,410-9,690 kc
"25 M" (25 Meters) 11,680-11,920 kc
"19 M" (19 Meters) 15,090-15,380 kc
Intermediate Frequency

R-F ALIGNMENT FREQUENCIES

"49 M" (49 Meters) 6,100 kc. (osc., det., ant.)
"31 M" (31 Meters) 9,600 kc. (osc.)
"25 M" (25 Meters) 11,700 kc. (osc.)
"19 M" (19 Meters) 15,300 kc. (osc.)
"Standard Broadcast" 600 kc. (osc.), 1,500 kc. (osc.)
460 kc.

RADIOTRON COMPLEMENT

(1) Type-1D5GP R-F Amplifier
(2) Type-1H4G Heterodyne Oscillator
(3) Type-1C7G First Detector (Converter)
(4) Type-1D5GP Intermediate Amplifier

(5) Type-1F7G...Second det., A-F Amp., and A.V.C.
(6) Type-1H4G Driver
(7) Type-1J6G Power Output

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" two 4½ volt plug-in type "C" batteries.

CURRENT CONSUMPTION

"A" at 2 volts75 Amperes

"B" at 135 Volts 17 Milliampers

Fuse Rating ½ Ampere

POWER OUTPUT

Undistorted 1.2 watts

Maximum 2.2 watts

LOUDSPEAKER

Type 10 inch Permanent Magnet Dynamic

Impedance (V.C.) 2.2 ohms at 400 cycles

Mechanical Specifications

Height 40 ¼ inches

Width 26 7/8 inches

Depth 14 ¾ inches

Weight (net) 62 pounds

Weight (shipping) 75 pounds

Chassis Base Dimensions 14 ¾ inches x 9 ¾ inches x 3 ½ inches

Over-all Chassis Height 10 ¾ inches

Operating Controls (1) Power Switch-Tone, (2) Volume (3) Tuning (4) Range Selector

Tuning Drive Ratio 10 to 1

General Description

This receiver employs an seven-tube, five band, superheterodyne circuit, the arrangement of which is shown by the Schematic Circuit Diagram. Features of design include: Spread Band dial; and r-f amplifier stage with "qumulative-wound" antenna and detector "A" Band coil for high signal to noise ratio; magnetite-core i-f transformers and low frequency oscillator

tracking; full automatic volume control; phonograph terminal board; 10 inch dust-proof electrodynamic loudspeaker; plunger-type, air dielectric trimming capacitors; temperature-stabilized capacitors; aural-compensated audio volume control and continuously variable high-frequency tone control.

Circuit Arrangement

The circuit consists of an r-f amplifier stage; first detector (converter) stage; separate heterodyne-oscillator stage; one i-f amplifier stage; second detector, audio voltage amplifier, and automatic volume control stage; audio driver stage; and power amplifier stage.

The antenna and first-detector coils are constructed with a special type of winding (qumulative) to provide increased sensitivity and selectivity on the "Standard Broadcast" band. Special capacitors shunting the spread-band oscillator coils change in capacity with temperature variations to reduce oscillator frequency drift.

Spread-band tuning is accomplished electrically by shunting the low-capacity section of the oscillator variable capacitor with relatively large temperature-stabilized fixed capacitors for tuning the oscillator coil

on the "19M," "25M," "31M," and "49M" bands. Antenna and first-detector coils are designed to be sufficiently broad-tuned to require no variable tuning over the narrow frequency range of the spread-bands.

The spread-band oscillator coils and the "Standard Broadcast" band oscillator, first detector, and antenna coils are all wound on separate forms. The antenna and first detector spread-band coils are tapped. Undesirable interaction between coils is avoided by shorting proper unused sections by means of the range selector.

The intermediate-frequency amplifier consists of a Type 1D5GP tube in a single stage transformer-coupled circuit. The windings of all i-f transformers are resonated by fixed capacitors and are adjusted by moulded magnetite cores to tune to 460 kc.

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.

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. The Model R-93B 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.

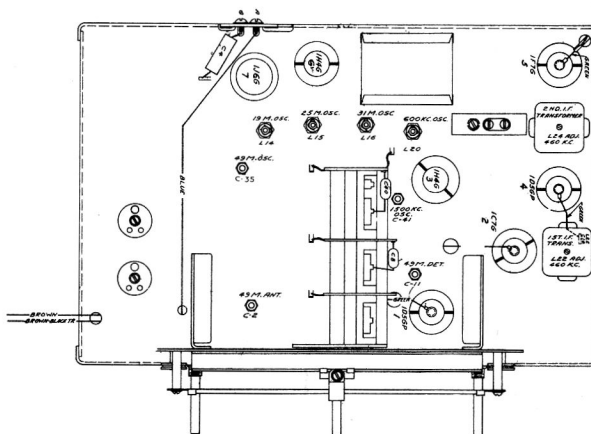


Figure 1—Radiotron, Coil and Trimmer Locations

RADIOTRON VOLTAGES:—Measured with all batteries at Normal Voltage				
Radiotron	Plate	Screen Grid	Grid	Filament
1D5GP—R.F.	135 V	50 V	.....	1.95 V
1C7G—Conv.	135 V	50 V	-3.0 V	1.95 V
1H4G—Osc.	120 V	.....	.....	1.95 V
1D5GP—I.F.	135 V	50 V	.....	1.95 V
1F7G—Det.	.....	.....	.....	.....
Audio	65 V	32 V	-1.0 V	1.95 V
1H4G—Driver	129 V	.....	-7.6 V	1.95 V
1J6G—Output	135V/135V	.....	-7.6 V	1.95 V

Alignment Procedure

Calibrate the tuning dial by adjusting the dial pointer to the low frequency (end) calibration mark on dial with the gang tuning-condenser plates in full-mesh position. This is a friction adjustment.

Permit the set to operate at least five minutes before attempting alignment.

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 2.

Cathode-ray alignment is highly preferable; the connections to the chassis are shown on figure 4. If an output indicator is used, connect it across the loud-speaker 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.

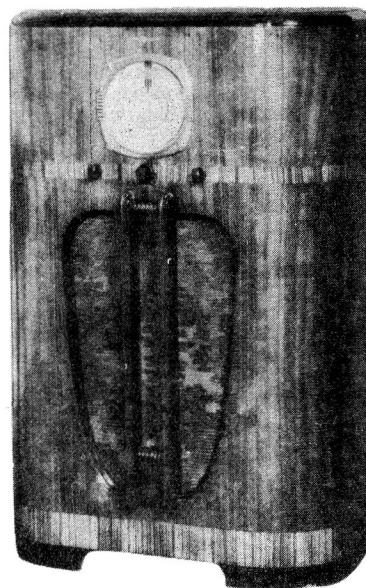
Order of Alignment	Test Oscillator			Range Selector	Receiver Dial Setting	Circuit to Adjust	Adjustment Symbols	Adjust to Obtain
	Connection to Receiver	Dummy Antenna	Frequency Setting					
1	1D5GP I.F. Grid Cap	.001 Mfd.	460 kc	"A"	No Signal 550-750 kc	2nd I.F. Trans.	L23 & L24	Max. (peak)
2	1C7G Det. Grid Cap	.001 Mfd.	460 kc	"A"	No Signal 550-750 kc	1st I.F. Trans.	L21 & L22	Max. (peak)
3	Ant. Term	300 Ohms	6,100 kc	"49 M"	6.1 mc	"49M" Osc.	C-35	Max. (peak)
4	Ant. Term	300 Ohms	6,100 kc	"49 M"	6.1 mc	"49M" Det.	C-11	Max. (peak)
5	Ant. Term	300 Ohms	6,100 kc	"49 M"	6.1 mc	"49M" Ant.	C-2	Max. (peak)
6	Ant. Term	300 Ohms	9,600 kc	"31 M"	9.6 mc	"31M" Osc.	L16	Max. (peak)
7	Ant. Term	300 Ohms	11,700 kc	"25 M"	11.7 mc	"25M" Osc.	L15	Max. (peak)
8	Ant. Term	300 Ohms	15,300 kc	"19 M"	15.3 mc	"19M" Osc.	L14	Max. (peak)
9	Ant. Term	200 Mmfd.	1,500 kc	"A"	1,500 kc	"A" H-F Osc.	C41	Max. (peak)
10	Ant. Term	200 Mmfd.	600 kc	"A"	600 kc	"A" L-F Osc.	L20	Max. (peak)

Spread-Band Alignment. — The most satisfactory method of aligning or checking the spread-band ranges is on actual reception of short-wave stations of known frequency, by adjusting the magnetite-core oscillator coil for each band so that these stations come in at the correct points on the dial.

In exceptional cases, when the set is being serviced in a location where the noise level is high enough to prevent reception of short-wave stations, a test-oscillator may be used for alignment, but an extremely high degree of accuracy is required in the frequency settings of the test-oscillator, as a slight error will produce considerable inaccuracy on the spread-band dials. The frequency settings of the test-oscillator may be checked by one or both of the following methods:

1. Determine the exact dial settings of the test-oscillator (for frequencies at or close to the specified alignment frequencies) by zero-beating the test-oscillator against short-wave stations of known frequency.
2. Use harmonics of the standard-broadcast range of a test-oscillator, first checking the frequency settings on this range by means of a crystal calibrator (GE Stock No. 9572), or by zero-beating against standard broadcast stations.

When a test oscillator is employed for spread-band alignment, a final check should be made on actual reception of short-wave stations of known frequency, and the magnetite-core oscillator coil for each band should be re-adjusted so that the stations come in at the correct points on the dial.



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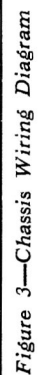


Figure 3—Chassis Wiring Diagram

Bias Cells—Three bias cells are used only for the purpose of supplying bias potential to the 1C7G first-detector 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 1C7G 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.

Operation With "M-100" Powerunit.—These receivers may readily be operated from a GE "M 100" Powerunit, in which case, a six-volt storage battery replaces the "A" and "B" batteries listed under "Batteries required." When using the "M 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 "M 100". When installing, the seven prong "M100" 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 wrong connection will burn out the tubes.

The following changes under "Electrical specifications" become effective when employing the "M 100"; "A" battery current drain at 6 volts, 1.65 amperes. Fuse rating, 3 amperes. Undistorted output, 1.9 watts. Maximum output, 3.5 watts. Under "Service data," the following voltages apply to the Type 1J6G power-output tube. Either plate to chassis, 165 volts. Either grid to chassis,—4½ volts. Plate current (either plate), 1.6 ma.

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

REPLACEMENT PARTS MODEL G7CB

STOCK No.	DESCRIPTION	STOCK No.	DESCRIPTION
RECEIVER ASSEMBLIES			
14380	Arm-Band indicator operating arm and hub less set screw Stock No. 14350...	11982	Fastener-Dial scale fastener-Pkg. of 25..
14384	Belt-Variable condenser drive belt....	3748	Fuse- $\frac{1}{2}$ ampere fuse.....
13216	Board-Antenna and ground terminal board.....	30085	Gear-Indicator drive gear and hub and pointer stem and gear.....
12717	Board-Phonograph terminal board.....	S-2129	Holder-Bias cell holder (single).....
S-2007	Bushing-Variable condenser mounting assembly.....	14405	Holder-Bias cell holder (triple).....
S-2127	Cable-Battery cable complete with fuse, fuse holder, one 7 contact female connector, and three 2 contact male connectors.....	14341	Idler-Station selector drive belt idler..
30314	Cap-Grid contact cap-Package of 5....	S-2130	Indicator-Station selector indicator pointer.....
12607	Cap-First I.F. Transformer shield top.	S-1998	Indicator-Band indicator.....
12581	Cap-Second I.F. Transformer shield top	11347	Knob-Volume control-tone control or range switch knob.....
S-2128	Cap-Station selector indicator pointer cap.....	12699	Knob-Station selector knobs.....
12884	Capacitor-Adjustable trimmer (C2,C11, C35,C41).....	14028	Nut-Jamb nut for trimmer Stock No.12884- Package of 10.....
14392	Capacitor-4.7 Mmfd. (C8).....	12471	Plate-1H4G socket mounting plate assembly for cushion socket-less socket.....
13002	Capacitor-12 Mmfd. (C40).....	14404	Plug-7 contact male plug located on rear apron of chassis for battery cable.....
13307	Capacitor-56 Mmfd. (C14).....	12827	Plug-"B" Battery cable plug.....
12723	Capacitor-56 Mmfd. (C20).....	11341	Plug-"C" Battery cable plug.....
12813	Capacitor-82 Mmfd. (C7).....	14340	Pulley-Station selector drive belt pulley and knob shaft.....
14910	Capacitor-90 Mmfd. (C12).....	14406	Resistor-.30 ohms flexible type resistor (R18).....
14908	Capacitor-96.5 Mmfd. (C34).....	14720	Resistor-1000 ohms,carbon type, $\frac{1}{2}$ watt (R2,R16).....
14906	Capacitor-100 Mmfd. (C32).....	5144	Resistor-2700 ohms,carbon type, $\frac{1}{2}$ watt (R14).....
14907	Capacitor-103.5 Mmfd. (C33).....	S-2133	Resistor-18,000 ohms,carbon type, $\frac{1}{2}$ watt (R5).....
14909	Capacitor-110 Mmfd. (C45).....	14284	Resistor-22,000 ohms,carbon type, 1/10 watt (R7).....
14262	Capacitor-109 Mmfd. (C13).....	S-2134	Resistor-27,000 ohms,insulated type, $\frac{1}{2}$ watt (R9).....
12404	Capacitor-120 Mmfd. (C16,C17).....	5029	Resistor-56,000 ohms,carbon type, $\frac{1}{2}$ watt (R17).....
12724	Capacitor-120 Mmfd. (C24).....	12286	Resistor-56,000 ohms,insulated type, $\frac{1}{2}$ watt (R4).....
14712	Capacitor-180 Mmfd. (C21).....	S-2135	Resistor-120,000 ohms,carbon type, $\frac{1}{2}$ watt (R12).....
12952	Capacitor-330 Mmfd. (C3,C10).....	11398	Resistor-220,000 ohms,carbon type, 1/10 watt (R8).....
12727	Capacitor-555 Mmfd. (C39).....	11397	Resistor-560,000 ohms,carbon type, 1/10 watt (R1,R3).....
12537	Capacitor-560 Mmfd. (C5).....	12200	Resistor-1 Megohm, insulated type, $\frac{1}{2}$ watt (R13,R11).....
S-2053	Capacitor-910 Mmfd. (C36).....	S-1536	Resistor-2.2 Megohm,carbon type, $\frac{1}{2}$ watt (R6).....
12897	Capacitor-4700 Mmfd. (C6,C37,C43).....	S-2132	Screw-Escutcheon mounting screw-Pkg. of 20
3932	Capacitor-.0025 Mfd. (C22,C26,C28).....	14350	Screw-#8-32 x 3/16 square head set screw for drum stock #14345, arm Stock #14380, and gear Stock #30085-Pkg. of 10.....
30363	Capacitor-.0035 Mfd. (C25).....	S-2039	Shield-Radiotron shield.....
14393	Capacitor-.01 Mfd. (C19).....	11196	Socket-Radiotron socket.....
5196	Capacitor-.035 Mfd. (C27).....	12007	Spring-Retaining spring for core Stock #12006-Package of 10.....
4839	Capacitor-0.1 Mfd. (C15,C23,C18,C4).....	14342	Spring-Tension spring for idler stock #14341-Package of 5.....
12484	Capacitor-0.25 Mfd. (C29,C44).....	S-2137	Switch-Range switch.....
14403	Capacitor Pack comprising two sections each 8 Mfd. (C30,C31).....	S-2138	Tone control and "ON" and "OFF" switch (R15,S5,S6).....
12681	Cell-Bias cell.....	S-2139	Transformer-Audio transformer pack (T1,T2).....
S-2064	Clip-Radiotron shield grounding clip-Pkg. of 10.....	14261	Transformer-First I.F. Transformer (L21,L22,C13,C14).....
S-1985	Coil-"A" band antenna coil (L6,L7)....	14283	Transformer-Second I.F. Transformer (L23,L24,C16,C17,C21,R7,R8).....
S-1986	Coil-Special band spread antenna coil (L1,L2,L3,L4,L5).....	S-1996	Volume control (R10).....
S-1987	Coil-"A" band detector coil (L12,L13).....	REPRODUCER ASSEMBLIES (100640-501)	
S-1988	Coil-Special band spread detector coil (L8,L9,L10,L11).....	S-2044	Cap-Dust cap for reproducer cone - Package of 5.....
S-2121	Coil-"A" band oscillator coil (L25,L26).....	S-2125	Cone-Reproducer cone (L25).....
S-2122	Coil-19 meter band oscillator coil (L20,L21).....	S-2126	Reproducer-Reproducer complete.....
S-1991	Coil-25 meter band oscillator coil (L22).....		
S-1992	Coil-31 meter band oscillator coil (L23).....		
S-2123	Coil-49 meter band oscillator coil (L24).....		
S-2015	Condenser-3 gang variable tuning condenser (C1,C9,C38,C42).....		
6516	Connector-Fuse connector complete.....		
12006	Core-Adjustable core and stud for Stock No.14261 and Stock No.14283....		
S-2000	Core-Coil Inductance assembly.....		
S-2141	Dial-Station selector dial scale.....		
S-2016	Drive-Variable condenser vernier drive pinion gear and shaft.....		
14345	Drum-Variable condenser drive belt drum complete with set screws.....		
S-2143	Escutcheon-Station selector escutcheon and crystal complete.....		