General Electric Co.

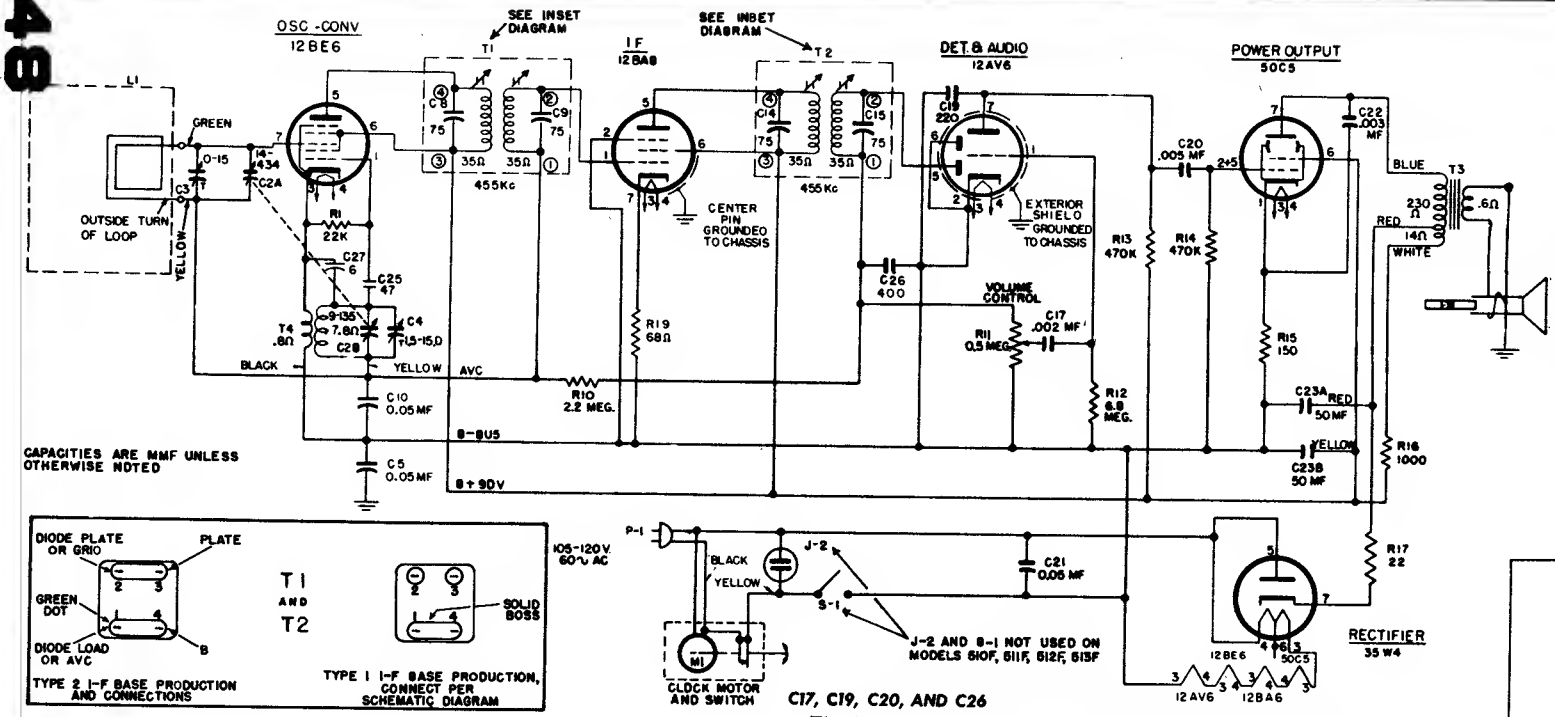
	Model: 513F	**Chassis:**	**Year:** Pre 1952
	Power:	**Circuit:**	**IF:**
	Tubes:		
	Bands:		

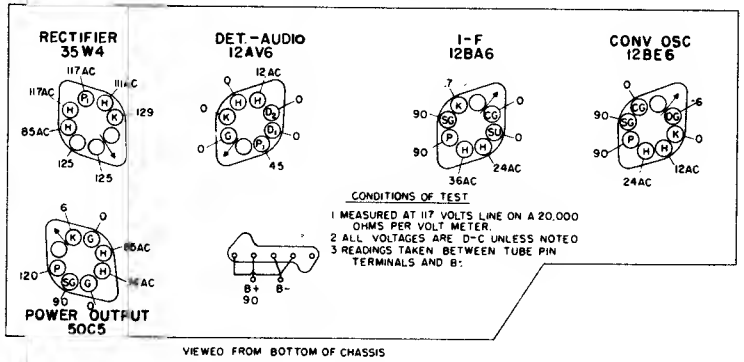
Resources
Beitmans 1951 48
Riders 22 (XXII) GE 22-7
Riders 22 (XXII) GE 22-8
Riders 22 (XXII) GE 22-9
Riders 22 (XXII) GE 22-10
Riders 22 (XXII) GE 22-11

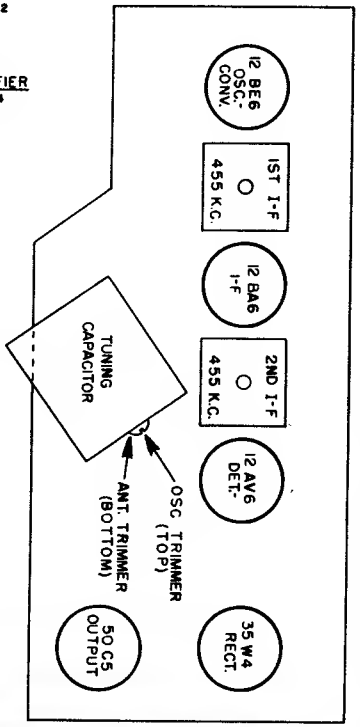
MANUAL OF 1951 MOST-OFTEN-NEEDED RADIO DIAGRAMS

GENERAL ELECTRIC

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, AND 522F

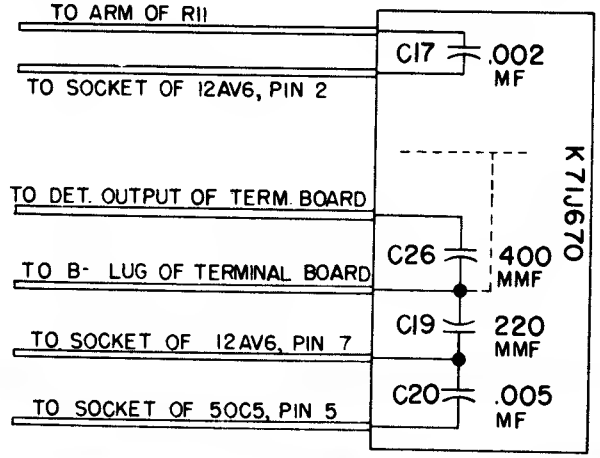






C17, C19, C20, AND C26

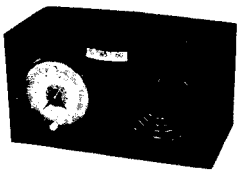
The lead identification for the four-section ceramic capacitor RCW-3048 (K71J670) can be observed from the illustration of Figure 2.



Capacitor RCW-3013

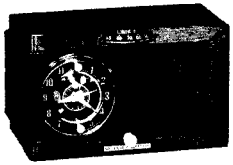
General Electric models as listed in the upper left hand corner, but without the suffix "F", use an identical circuit but employ 12SA7 instead of 12BE6, and 12SQ7 for 12AV6, and differ in physical assembly.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F

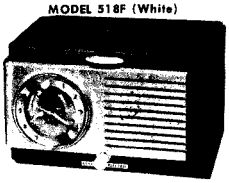


MODEL 510F (Brown)
MODEL 511F (Ivory)

MODEL 515F (Brown Mottle)
MODEL 517F (Maroon)
MODEL 516F (Ivory)
MODEL 518F (White)



MODEL 512F (Mahogany Mottle)
MODEL 513F (Antique Ivory)



MODEL 521F (Dark Mahogany)
MODEL 522F (Blonde Mahogany)

SPECIFICATIONS

OVER-ALL CABINET DIMENSIONS	Model	510F, 511F	515E, 516F, 517F, 518F	521F, 522F, 512F, 513F
	Height	6¼ in.	6 3/16 in.	6 3/16 in.
	Width	11 3/16 in.	11 13/16 in.	10½ in.
	Depth	5 3/16 in.	4¼ in.	6 in.
ELECTRICAL RATING	Voltage	105–120		
	Frequency	60 cycles (only)		
	Watts	30		
OPERATING FREQUENCIES	R-F Broadcast	540–1600 kc		
	I-F Amplifier	455 kc		
POWER OUTPUT	Undistorted	1 watt		
	Maximum	1.75 watts		
LOUDSPEAKER	Type	Alnico PM		
	Outside Cone Diameter	4 inches		
	Voice Coil Impedance @ 400 Cycles	3.5 ohms		

TUBE COMPLEMENT	Purpose	Type
	Oscillator-Converter	12BE6
	I-F Amplifier	12BA6
	Detector—1st Audio	12AV6
	Audio Output	50C5
	Rectifier	35W4

GENERAL INFORMATION

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F clock—radio receivers employ four tubes, plus rectifier tube in an a-c/d-c superheterodyne circuit using a Beam-a-scope antenna. Each model has an electric time clock with wake-up alarm. The cabinets are of plastic composition in the finishes and design shown in the photos.

A special feature of the Model 515F, 516F, 517F, 518F, 521F and 522F receivers includes a receptacle at the rear of the receiver which is controlled by the clock to provide automatic power control to an external appliance. The slide switch adjacent to the receptacle is used to turn off the radio if desired, while using the appliance. ***When radio operation is to be resumed, this switch must be set to the "ON" position.*** In addition, the clocks of this group of receivers are equipped with a sleep control which may be used to automatically turn off the radio and/or appliance.

The Models 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F and 522F receivers employ a new type chassis construction and change of tube type from that of other General Electric clock radios, described in ER-S-510, ER-S-515 and ER-S-521, bearing the same model number but without the suffix "F."

The distinguishing feature of this new type chassis construction may be noted in the connection to components and layout. Resistors and capacitors are connected directly by their leads to special tube sockets or terminal board in contrast to previous conventional methods using conventional tube sockets.

The cabinets and clocks of this series receivers whose model numbers are suffixed by "F" are identical to respective model numbers which do not bear the letter "F" as shown upon the identification label.

CAUTION: One side of the power line is connected to B—. Avoid any ground connections direct to B—. Use an isolating transformer when making service adjustments with the chassis removed from the cabinet.

COMPONENT REPLACEMENT—Except for tube socket replacement, it should not be necessary to remove the doughnut shaped shields over the tube sockets in servicing the chassis. The time and effort otherwise spent to remove shields and heat connections to free components may be spared and a neater job done without the risk of damage to the socket, by using the following method in wiring a replacement.

Clip the defective unit out, leaving enough of its leads to remain attached to the tube socket or terminal strip so an eye loop may be formed in each lead. Each lead of the new component may then be passed through the proper loop, pruned to length, crimped and soldered.

PRODUCTION WIRING CHANGE—Some early receivers will be found with one lead of the power cord connected to the pin 2 socket connection of the 35W4 rectifier tube. This connection has been known to be the cause of damage to the rectifier tube due to a 110 volt a-c arc within the tube between pin 2 and one of the tube elements. For this reason, it is recommended that the following change in wiring be made when the receiver is in the shop for service.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, etc.

The power cord lead is removed from pin 2 of the rectifier tube socket by clipping it off close to the socket connection. The a-c power lead to the clock is similarly removed from pin 8 of the 50C5 output tube socket. Strip, splice, and solder the two leads together, properly taping the connection for adequate insulation. At least two wraps of standard friction tape is required. The remaining bus wire between pin 2 of the 35W4 tube and pin 8 of the 50C5 should then be clipped off close to the socket connection and removed. Some later sets have both leads inserted in pin No. 8 of the 50C5 socket and still later sets utilize pin No. 8 of the 35W4 socket and pin No. 8 of the 12AV6 socket for this connection. Both of these methods are satisfactory and should cause no trouble.

It is only when a solid B— connection is made to pins 1 or 2 of the 35W4 that the arc occurs. A direct short to one of these pins might by coincidence cause this phenomena.

OSCILLATOR COIL, T4—The oscillator coil is wired to be self-supporting through the use of solid bus wire connections. With the exception of some early receivers, the coil lugs are spaced sixty degrees from each other so that they are grouped over one half of the coil circumference as shown in Figure 2. An early type coil may occasionally be found whose lug spacing is eighty degrees. However this presents no difficulty in lug identification, if one bears in mind that the wider space of one hundred and twenty degrees is to be oriented with that half of the coil form which is bare of lugs in the illustration.

CLOCK SERVICE AND REPLACEMENT PARTS—For clock service data and repair parts, contact your local Wholesale General Electric Radio Distributor.

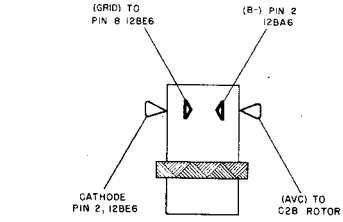


Fig. 1. Oscillator Coil Connections

C17, C19, C20, AND C26

The lead identification for the four-section ceramic capacitor RCW-3048 (K71J670) can be observed from the illustration of Figure 2.

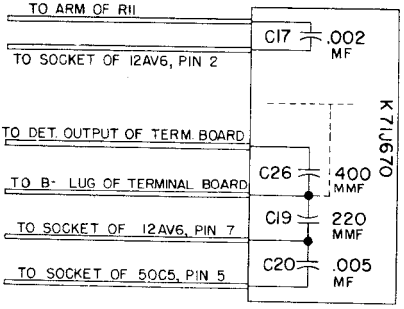


Fig. 2. Capacitor RCW-3048

RADIO CIRCUIT ALIGNMENT

ALIGNMENT FREQUENCIES:

R-F	1500 kc
R-F	1620 kc
I-F	455 kc

EQUIPMENT REQUIRED:

1. Test oscillator with tone modulation.
2. A-c output meter, 1½ volts full scale.
3. 0.05 mf. paper capacitor.
4. Loop. (See note 6.)
5. Insulated screwdriver.

PROCEDURE—GENERAL:

1. With the tuning scale control wheel turned so that the gang condenser plates are fully meshed, the last calibration mark on the scale (low frequency side of 550 kc) should face directly to the front of the chassis so that the mark will align with the index tab or mark located on the cabinet over the tuning control wheel. If it does not, remove the control wheel from the gang condenser shaft and replace it for correct position. CAUTION: Do not attempt to correct the position by rotating the wheel on the shaft as this will cause the knob to slip.

2. For i-f alignment, it is necessary to remove the chassis from the cabinet.

3. Connect the output meter across the loudspeaker voice coil terminals.

4. Keep radio volume control at maximum and attenuate the test oscillator signal output so that the output meter reading never exceeds 1.0 volt.

5. Connect the capacitor, listed in column 2 of the alignment chart, between the output "High Side" of the test oscillator and the point of input specified. The oscillator output cable ground lead is connected to receiver chassis.

6. For alignment of the oscillator and antenna trimmers, the input signal should be inductively coupled to the radio loop antenna, L1, by connecting a four-turn, six-inch diameter loop of bell wire across the signal generator output terminals, and then locating the loop to face the radio antenna loop about one foot away.

ALIGNMENT CHART

Step	Connect Test Oscillator to	Test Osc. Setting	Dial Drum Setting	Adjust for Maximum Output
1	12BA6 grid (1) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	2nd I-F transformer cores
2	12BE6 grid (7) in series with 0.05 mf. cap.	455 kc	Minimum Capacity	1st I-F transformer cores
3	Inductively coupled to radio loop	1620 kc	Minimum Capacity	C4 (oscillator)
4	Inductively coupled to radio loop	1500 kc	Tune for Maximum	C3 (antenna)

STAGE GAIN AND VOLTAGE CHECKS

Stage gain measurements by vacuum tube voltmeter or similar measuring devices may be used to check circuit performance and isolate trouble. The gain values listed may have tolerances of 20%. Readings taken with low signal input so that AVC is not effective.

(1) I-F Stage Gains.
12BE6 Grid to 12BA6 Grid . . . . . 50 @ 455 kc
12BA6 Grid to 12AV6 Diode Plate . . . . . 50 @ 455 kc

(2) Audio Gain.
0.15 volts at 400 cycles across the volume control (R11) with control set at maximum will give approximately ½-watt output across the loudspeaker, LS1, voice coil.

(3) Oscillator Grid Bias.
D-c voltage developed across the oscillator grid leak (R1) averages 6 volts at 1000 kc.

(4) Socket Pin Voltages.
Figure 4 shows voltages from all tube pins to B— unless otherwise specified. Voltage readings much higher or lower than those specified may help localize defective components or tubes.

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F

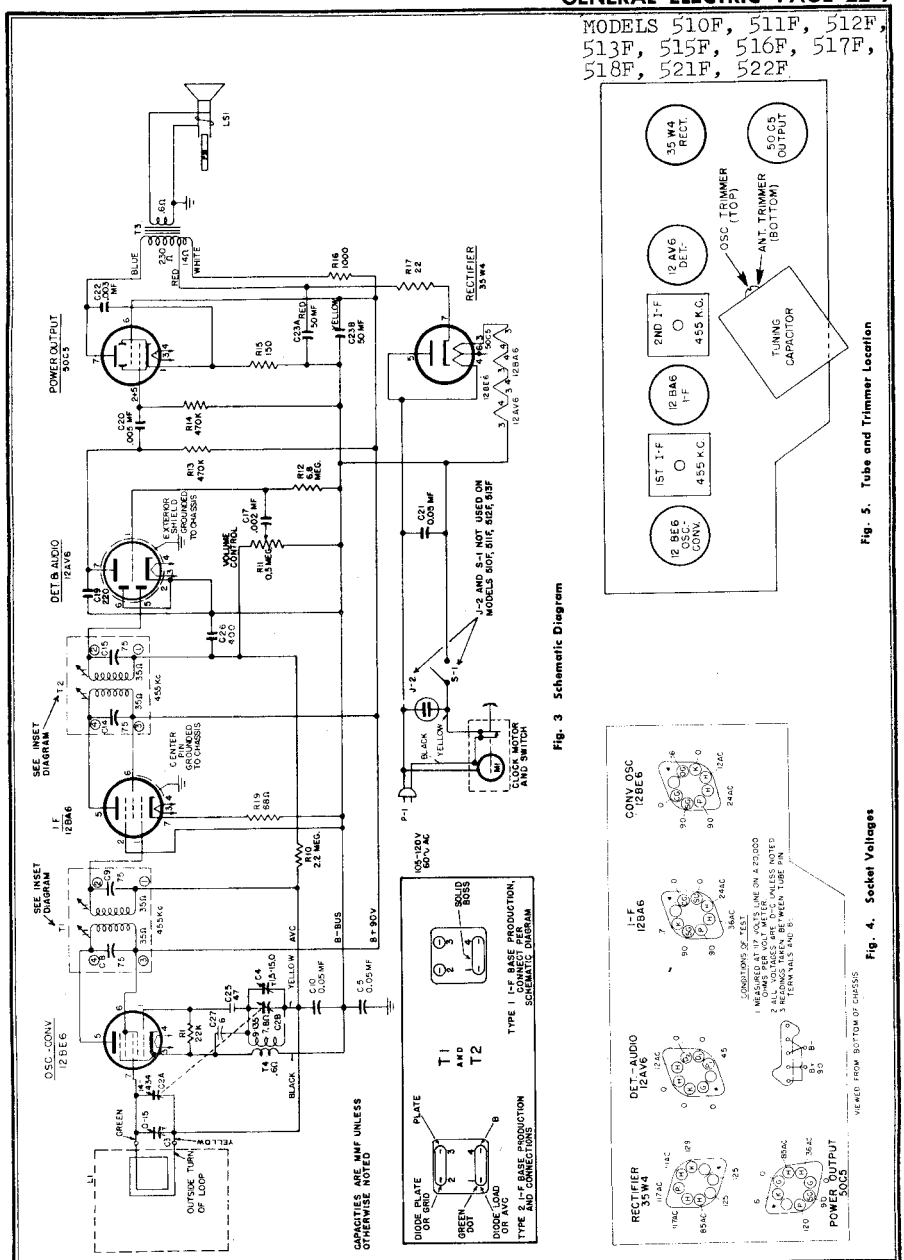


Fig. 3 Schematic Diagram

Fig. 5. Tube and Trimmer Location

Fig. 4. Socket Voltages

MODELS 510F, 511F, 512F,
513F, 515F, 516F, 517F,
518F, 521F, 522F

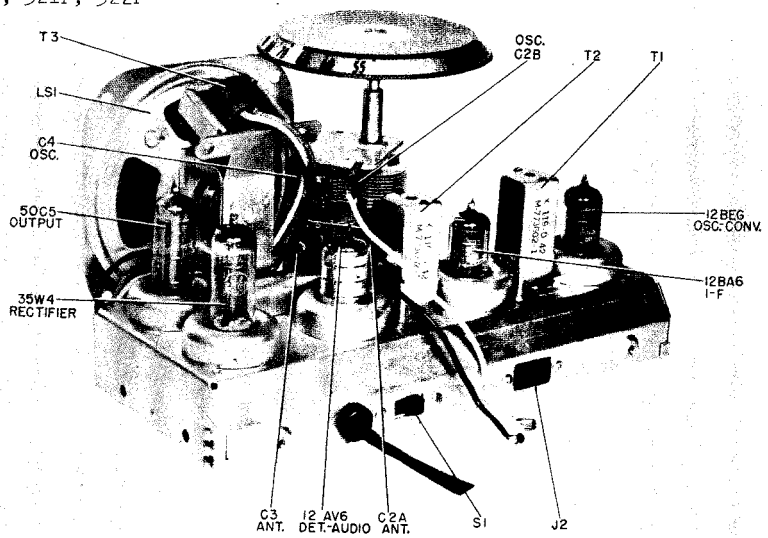


Fig. 6. Photo of Chassis (Top View)

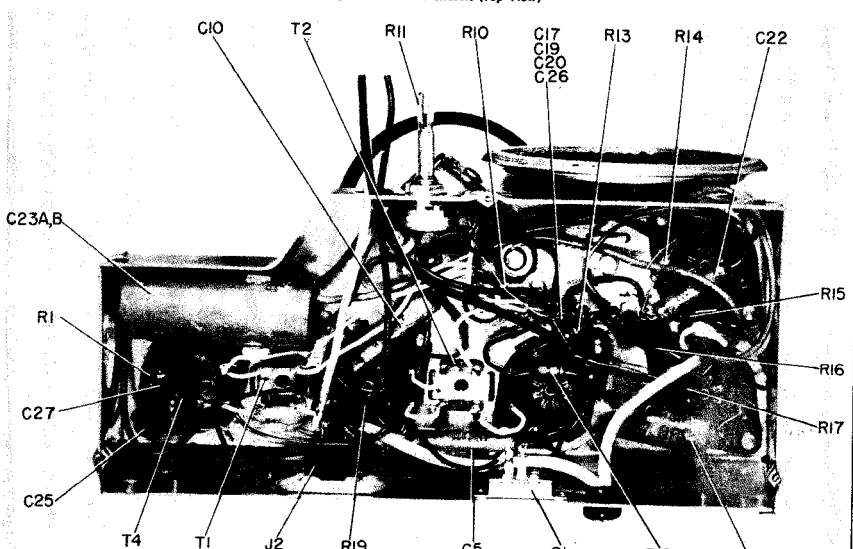


Fig. 7. Photo of Chassis (Bottom View)

MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, 522F

REPLACEMENT PARTS LIST—MODELS 510F, 511F, 512F, 513F, 515F, 516F, 517F, 518F, 521F, AND 522F

Cat. No.	Symbol	Description
RAB-149	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 510F, 511F
RAB-150	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, L1, for Models 515F, 516F, 517F, 518F
*RAB-151	L1	CABINET BACK—Back cover to cabinet, includes antenna loop, for Models 512F, 513F, 521F, 522F
*RAC-085		BRACKET—Clock mounting bracket (metal shield cover over back of clock)
*RAG-033		GRILLE—Cabinet grille cloth (dark maroon) for Models 510F, 515F, 517F
*RAG-034		GRILLE—Cabinet grille cloth (ivory) for Models 511F, 516F
*RAG-035		GRILLE—Cabinet grille cloth (white) for Model 518F
RAG-037		GRILLE—Cabinet grille cloth (gold finish) for Models 521F or 522F
*RAU-336		CABINET—Brown, plastic cabinet for Model 510F
*RAU-337		CABINET—Ivory plastic cabinet for Model 511F
*RAU-338		CABINET—Brown mottle, plastic cabinet for Model 515F
*RAU-339		CABINET—Ivory, plastic cabinet for Model 516F
*RAU-340		CABINET—Maroon, plastic cabinet for Model 517F
*RAU-341		CABINET—White, plastic cabinet for Model 518F
*RAU-342		CABINET—Dark mahogany, plastic cabinet for Model 521F
*RAU-343		CABINET—Blonde mahogany, plastic cabinet for Model 522F
RAU-348		CABINET—Mahogany mottle, plastic cabinet for Model 512F
RAU-349		CABINET—Antique ivory, plastic cabinet for Model 513F
RCC-107	C21	CAPACITOR—.047 mf., 600 v., paper
RCC-108	C22	CAPACITOR—.003 mf., 600 v., paper
RCE-127	C23A, B	CAPACITOR—50-50 mf., 150 v., electrolytic
*RCT-045	C2A, B	CAPACITOR—420-126 mmf., dial tuning capacitor
RCW-3048	C17, 19, 20, 26	CAPACITOR—.002 mf., 220 mmf., .005 mf., 400 mmf., four section ceramic unit
RCW-3049	C27	CAPACITOR—6 mmf. ±5%, 1400 to 2200 neg. temp. coefficient, ceramic
*RDK-215		KNOB—Volume control knob (white) for Model 518F
*RDK-216		KNOB—Dial tuning control knob (maroon) for Models 510F, 511F
*RDK-217		KNOB—Dial tuning control knob (gold bronze color) for Models 515F, 516F, 517F, 521F, 522F
*RDK-218		KNOB—Volume control knob (maroon) for Model 517F
*RDK-219		KNOB—Dial tuning control knob (aluminum color) for Model 518F
*RDK-230		KNOB—Volume control knob (ivory) for Models 510F, 511F, 513F, 515F, 516F, 517F, 521F, 522F
RDK-243		KNOB—Volume control knob (fawn) for Model 512F
RDK-245		KNOB—Dial tuning control knob (ivory scale, maroon numerals) for Model 513F
RDK-246		KNOB—Dial tuning control knob (brown scale, gold numerals) for Model 512F
*RHC-024		CLIP—Mounting clip for electrolytic capacitor, C23A, B
*RHC-034		CLIP—Metal clip fastener used to mount 1st and 2nd i-f transformer can assemblies to chassis
*RHG-015		GROMMET—Rubber grommet used to insulate and shock mount tuning capacitor (C2A, B) to chassis

Cat. No.	Symbol	Description
*RHH-004		FASTENER—Snap-on fastener for holding cabinet back to cabinet (used only on Models 521F, 522F)
*RHI-010		GROMMET—Strain relief and insulating grommet in chassis back apron for power cord for Models 515F, 516F, 517F, 518F, 521F, 522F
*RHJ-005		SPACER—Metal spacer bushing in grommet mounting tuning capacitor (C2A, B) to chassis
*RHS-048		SHIELD—Metal tube shield for V3, 12AV6
RHS-073		SHIELD—Doughnut shaped metal cover over soldered pin connections of tube sockets
RHS-074		SHIELD—Metal protective shield cover on top of chassis over wiring terminal board
RHS-075		SCREW—Screw No. 6 x ⅜-in. long used to fasten chassis in cabinet
*RJJ-008	J2	RECEPTACLE—AC power receptacle on chassis back apron used for automatic control of electrical appliances for Models 515F, 516F, 517F, 518F, 521F, 522F
RJS-158		SOCKET—Tube socket for V2, 12BA6
RJS-162		SOCKET—Tube socket for V1, 12BE6
RJS-163		SOCKET—Tube socket for V3, 12AV6; V4, 50C5; V5, 35W4
RLC-109	T4	COIL—Oscillator coil
*RMS-214		SPRING—Spring retaining ring for hub of dial tuning knob
*RRC-054	R11	POTENTIOMETER—500,000 ohms, composition volume control
*RSW-067	S1	SWITCH—Radio ON-OFF switch (slide type) on chassis back apron for Models 515F, 516F, 517F, 518F, 521F, 522F
*RTL-117	T1, 2	TRANSFORMER—1st or 2nd i-f coupling
RTO-999	T3	TRANSFORMER—Audio output
*RWL-009	P1	CORD—AC power cord and plug (brown) for Models 510F or 512F
*RWL-016	P1	CORD—AC power cord and plug (ivory) for Models 511F or 513F
*RWL-024	P1	CORD—AC power cord and plug (white) for Model 518F
*RWL-025	P1	CORD—AC power cord and plug (brown) for Models 515F, 517F, 521F, 522F
*RWL-026	P1	CORD—AC power cord and plug (ivory) for Model 516F
*RYN-005		NAMEPLATE—General Electric monogram (metal, on cabinet) for Models 512F, 513F, 521F or 522F
*RZC-009	M1	CLOCK—60 cycle, 105-125 v., clock assembly for Models 515F, 516F, 517F, 521F, 522F
*RZC-011	M1	CLOCK—60 cycle, 105-125 v. clock assembly for Model 518F
*RZC-012	M1	CLOCK—60 cycle, 105-125 v. clock assembly for Models 510F, 511F
RZC-014	M1	CLOCK—60 cycle, 105-125 v., clock assembly for Model 512F
RZC-015	M1	CLOCK—60 cycle, 105-125 v., clock assembly for Model 513F
RQP-022		LOUDSPEAKER—4 inch PM
*UCC-036	C17	CAPACITOR—.002 mf., 600 v., paper
*UCC-039	C20	CAPACITOR—.005 mf., 600 v., paper
*UCC-045	C5, 10	CAPACITOR—.05 mf., 600 v., paper
*UCG-020	C25	CAPACITOR—47 mmf., 500 v., silver mica
*UCU-1036	C19	CAPACITOR—220 mmf., mica
*URD-009	R17	RESISTOR—22 ohms, ½ w., carbon
*URD-021	R19	RESISTOR—68 ohms, ½ w., carbon
*URD-029	R15	RESISTOR—150 ohms, ½ w., carbon
*URD-081	R1	RESISTOR—22,000 ohms, ½ w., carbon
*URD-113	R13, 14	RESISTOR—470,000 ohms, ½ w., carbon
*URD-129	R10	RESISTOR—2.2 meg., ½ w., carbon
*URD-141	R12	RESISTOR—6.8 meg., ½ w., carbon
*URF-049	R16	RESISTOR—1000 ohms, 2 w., carbon