General Electric Co.

	Model: X-228	**Chassis:**	**Year:** Pre 1945
	Power:	**Circuit:**	**IF:**
	Tubes:		
	Bands:		

Resources

- Riders Volume 14 - GE 14-42
- Riders Volume 14 - GE 14-43
- Riders Volume 14 - GE 14-44

MODEL X-226

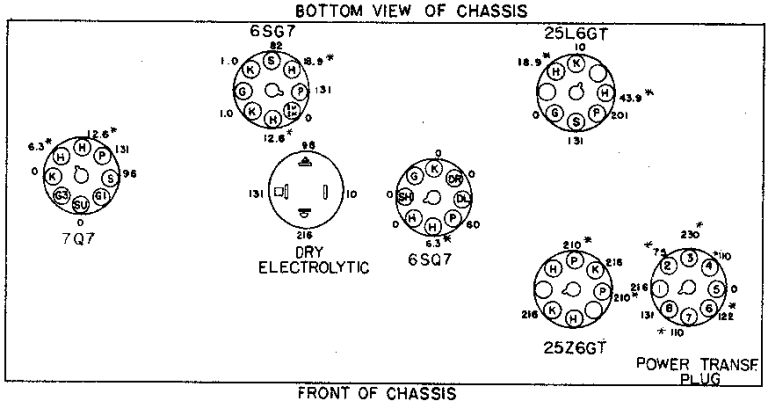
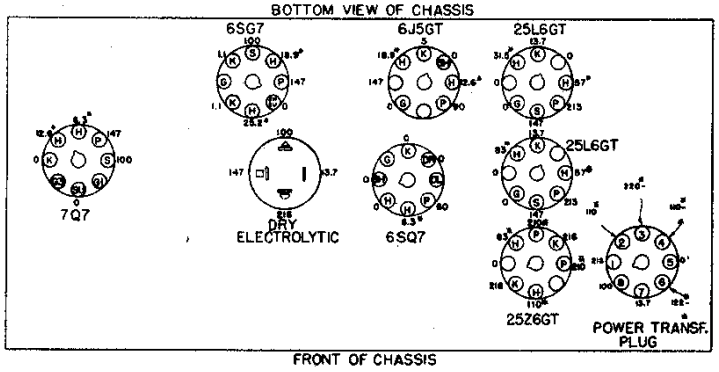


Fig. 3 Socket Voltages

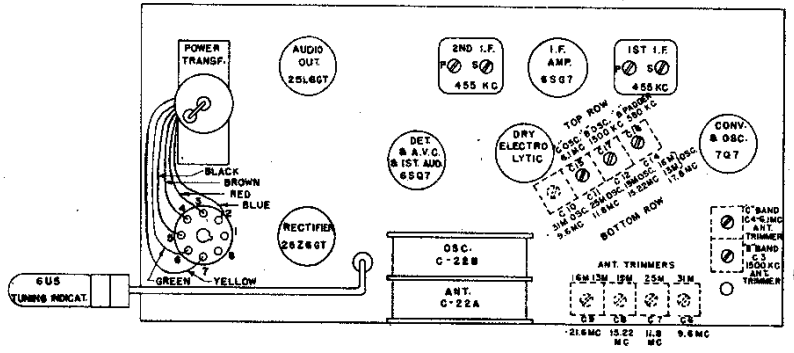
Variations of ±20% permissible. All measurements taken with R-26 shorted across.

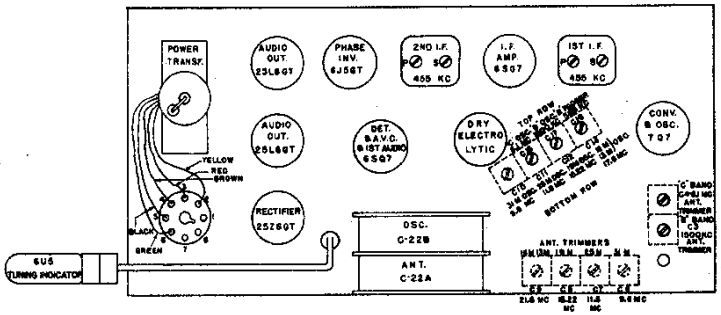
MODEL X-228

Variations of ±20% permissible. All measurements taken with R-26 shorted across.



VOLTAGES INDICATED BY ASTERISK (*) ARE AC VOLTAGES. VOLTAGES READ WITH 1000 OHMS/VOLT METER ON 250-VOLT SCALE





MODEL X-226 MODEL X-228

Alignment Procedure

The alignment procedure shown in table form is made either with the chassis in or removed from the cabinet.

If the chassis is removed from the cabinet to make the RF alignment, the dial which is fastened to the cabinet cannot be used for calibration reference. Use must be made, therefore, of the paper scale fastened on the rear of the dial reflector plate. With the gang condenser completely closed, one of the edges of the pointer rider should be lined up with the first marking to the right of the scale on the rear of the dial reflector plate. This can be accomplished by sliding the pointer on the cord until it does. The selected edge of the pointer rider may now serve as a pointer for the RF alignment. There are two 17.8 reference points on the paper scale on the rear of the dial reflector plate. The one towards the lower frequency end of the dial is the proper one to use for the 16-meter spread-band alignment; while the other is used for a reference point on the SW2 band.

The SW2 band does not require alignment. This band is taken care of when the 16-meter spread-band is aligned.

Spread-band Alignment

Since accuracy in frequency calibration is very essential for proper alignment of the spread-bands, it is impractical to use the standard test oscillator for this purpose unless a special calibration is first made.

The actual reception of short-wave stations of known frequency in the band to be checked is probably the most satisfactory method of determining the proper setting of the oscillator trimmers in these bands. The oscillator trimmer should be adjusted so that the station appears at the correct position on the dial. RF alignment can be made with the test oscillator.

The calibration of the test oscillator may be checked by zero beating the test oscillator with a short-wave station of known frequency. By taking several of these calibration points, it will afford a calibration of a high degree of accuracy in case you wish to use the test oscillator for alignment in these bands.

ALIGNMENT CHART

Step	Test Osc. Connected to	Test-osc. Setting	Band and Pointer Setting	Tune Trimmer for Max. Output
1	6SG7 I.F. grid in series with .05 mfd. cap.	455 KC	"BC" BAND 550 KC	C26 and C27
2	7Q7 CONV. grid in series with .05 mfd. cap	455 KC	"BC" BAND 550 KC	C24 and C25
3	ANT. POST in series with 200 mmf. and 400 ohms	580 KC	"BC" BAND 580 KC	C16**
4	ANT. POST in series with 200 mmf. and 400 ohms	1500 KC	"BC" BAND 1500 KC	C17 (osc.) C3 (ant.)
5	REPEAT STEP 3			
6	ANT. POST in series with 200 mmf. and 400 ohms	6.1 MC	"SW-1" BAND 6.1 MC	C15 (osc.) C4 (ant.)
7	ANT. POST in series with 200 mmf. and 400 ohms	17.8 MC	16 METER 17.8 MC	C14* (osc.)
8	ANT. POST in series with 200 mmf. and 400 ohms	21.6 MC	16 METER 21.6 MC	C9*** (ant.)
9	ANT. POST in series with 200 mmf. and 400 ohms	15.22 MC	19 METER 15.22 MC	C10* (osc.) C6*** (ant.)
10	ANT. POST in series with 200 mmf. and 400 ohms	11.8 MC	25 METER 11.8 MC	C11* (osc.) C7*** (ant.)
11	ANT. POST in series with 200 mmf. and 400 ohms	9.6 MC	31 METER 9.6 MC	C12* (osc.) C8*** (ant.)

*Use minimum capacity peak if two are obtainable.
**Rock gang condenser for optimum peak.
***Use maximum capacity peak if two are obtainable.

BAND CHANGE SWITCHING

The following charts show the switch points connected for any one position of the wave change switch. The numbers shown in each box indicate the switch points connected together in the section of the switch for each position of the switch. As for example: the numbers 5-9-10 indicate these switch points are all connected together for this particular position of the switch.

BAND SWITCH CONNECTIONS

Band in Use	Section "A" Front Side	Section "A" Back Side	Section "B" Front Side	Section "B" Back Side
BC	4-8-9	5-9-10	5-9-10	1-10 6-8
SW1	4-8-10	5-9-11	5-9-11	1-2-10 7-8
SW2	4-8-11	5-9-12	5-9-12	1-2-3 8-10
31 METER	8-11	9-12-1	9-12-1	1-2-3-4 8-10
25 METER	8-11	9-12-2	9-12-2	1-2-3-4-5 8-10
19 METER	8-11	9-12-3	9-12-3	2-3-4-5-6 8-10
16 and 13 METER	8-11	9-12	9-12	3-4-5-6-7 8-10

SPECIAL SERVICE INFORMATION

The following information will be very useful in servicing receivers if a vacuum tube voltmeter or similar voltage measuring instrument is available.

NOTE—Connection to converter grid must be made directly to tube grid and not to gang condenser on spread bands.

(1) Stage gains

(a) Antenna Post to Converter Grid, through 400 ohms and 200 mmfd. in series, at

Stand.	1000 KC	5.4	31 M	9.6 MC	1.8
SW1	4000 KC	3.7	25 M	11.8 MC	1.6
SW2	18000 KC	1.1	19 M	15.22 MC	1.4
			16-13 M	17.8 MC	1.0

(b) RF on Converter Grid to IF on 6SG7 grid at

Stand.	1000 KC	.61	31 M	9.6 MC	.65
SW1	4000 KC	.63	25 M	11.8 MC	.68
SW2	18000 KC	.71	19 M	15.22 MC	.71
			16-13 M	17.8 MC	.71

(c) IF on Converter Grid to IF on 6SG7 grid at 455 KC—85

(d) IF Grid to diode plate at 455 KC—160

(2) Voltage across the diode load to give ½-watt speaker output at 400 cycles—.046 V.

(3) DC voltage developed across oscillator and resistor (R1) at

Stand.	1000 KC	8.3 V.	31 M	4.4 V.
SW1	4000 KC	7.7 V.	25 M	4.8 V.
SW2	18000 KC	5.0 V.	19 M	4.4 V.
			16-13 M	3.7 V.

Loud-speaker

The voice coil is accurately and permanently centered at the factory and should seldom give trouble. In case a voice coil needs recentering, it will be necessary to replace the entire cone and voice coil assembly. In no case should you attempt to move the magnet in the assembly.

MODEL X-226

CONVERSION FOR SPECIAL LINE VOLTAGES

The Model X-226 can be converted for operation on the following line voltages. In all cases where the power transformer is replaced with a ballast resistor, the power transformer must be removed from the chassis as the radiant heat from the ballast resistor is likely to injure the transformer insulation. When operated with these special resistors and lower power supplies than 220 volts, the audio power output and socket voltages will be reduced.

220 Volts AC/DC—(Range 200-240 Volts)

Remove transformer from chassis of X-226, insert ballast tube resistor RR-7007, and change rating on label to read 220 volts AC/DC.

180 Volts DC—(Range 160-200 Volts)

Remove transformer from chassis of X-226, insert the ballast tube resistor RR-7008 and change rating on label so that it reads 180 volts DC.

PHONOGRAPH INSTALLATION

1. Remove the link from terminals 1 and 2, and replace it between terminals 2 and 3.
2. Connect the record player to terminals 1 and 3. If the record player does not have a high-impedance pickup a matching transformer may have to be used. It is very important that the high side pick-up lead has a shield to prevent hum interference. This shield should be connected to terminal No. 3 and the high side pick-up lead to terminal No. 1.

If, on operating the record player, external radio signals leak through, turn the tuning control to a position where no radio signals would be received. Complete silencing of the external radio signals can be obtained by grounding the antenna terminal while operating the record player.

If, in operating the record player, there is appreciable hum interference, reverse the record player phonomotor power cord plug in the power supply outlet.

MODEL X-228

CONVERSION FOR SPECIAL LINE VOLTAGES

The Model X-228 can be converted for operation on the following line voltages. In all cases where the power transformer is replaced with a ballast resistor, the power transformer must be removed from the chassis as the radiant heat from the ballast resistor is likely to injure the transformer insulation. When operated with these special resistors and lower power supplies than 220 volts, the audio power output and socket voltages will be reduced.

220 Volts AC/DC—(Range 200-240 Volts)

Remove transformer from chassis of X-228, insert ballast tube resistor RR-7003, and note change on label.

180 Volts DC—(Range 160-200 volts)

Remove transformer from chassis of X-228; insert the ballast tube resistor RR-7004 and change the label on the receiver.

NOTE—The 8200 ohm, 1-watt resistor (R-35) shown in dotted lines for the RR-7004 ballast tube schematic is not a part of the ballast tube. In order to increase the sensitivity and power output of this receiver when operating in this voltage range, this resistor may be installed externally across the terminals 1 and 8 of the ballast tube socket.

MODEL X-228

117 Volts DC—(Range 105-129 Volts)

Remove transformer from chassis of X-228; insert the ballast tube resistor RR-7005 and change the label on the receiver.

NOTE—The power output on this receiver can be raised if the resistors R-18, R-24 and R-25 are shorted across.

Two other transformers are available for AC operation. The transformer T5 can be substituted in the Model X-228 receiver for operation on 25-cycle circuits. Re-mark the label so that it reads Model X-228C. The special duty transformer T6 can be used in the Model X-228 receiver for operation on 50/60 cycle circuits where a 145-volt tap is required. Re-mark the label on the recever so that it reads Model X-228X.

The cold resistance of all ballast tubes is shown directly on the schematic diagram, Fig. 2.

MODEL X-228

PHONOGRAPH INSTALLATION

Connect the record player output leads to the terminals marked 1 and 2. The high side of the pickup is connected to terminal No. 1, while the low side or ground is connected to terminal No. 2. With some low-impedance type of pickups, a suitable matching transformer may have to be used. It is very important that the high side phono pickup lead be shielded to prevent hum interference. The shield should be connected to terminal No. 2.

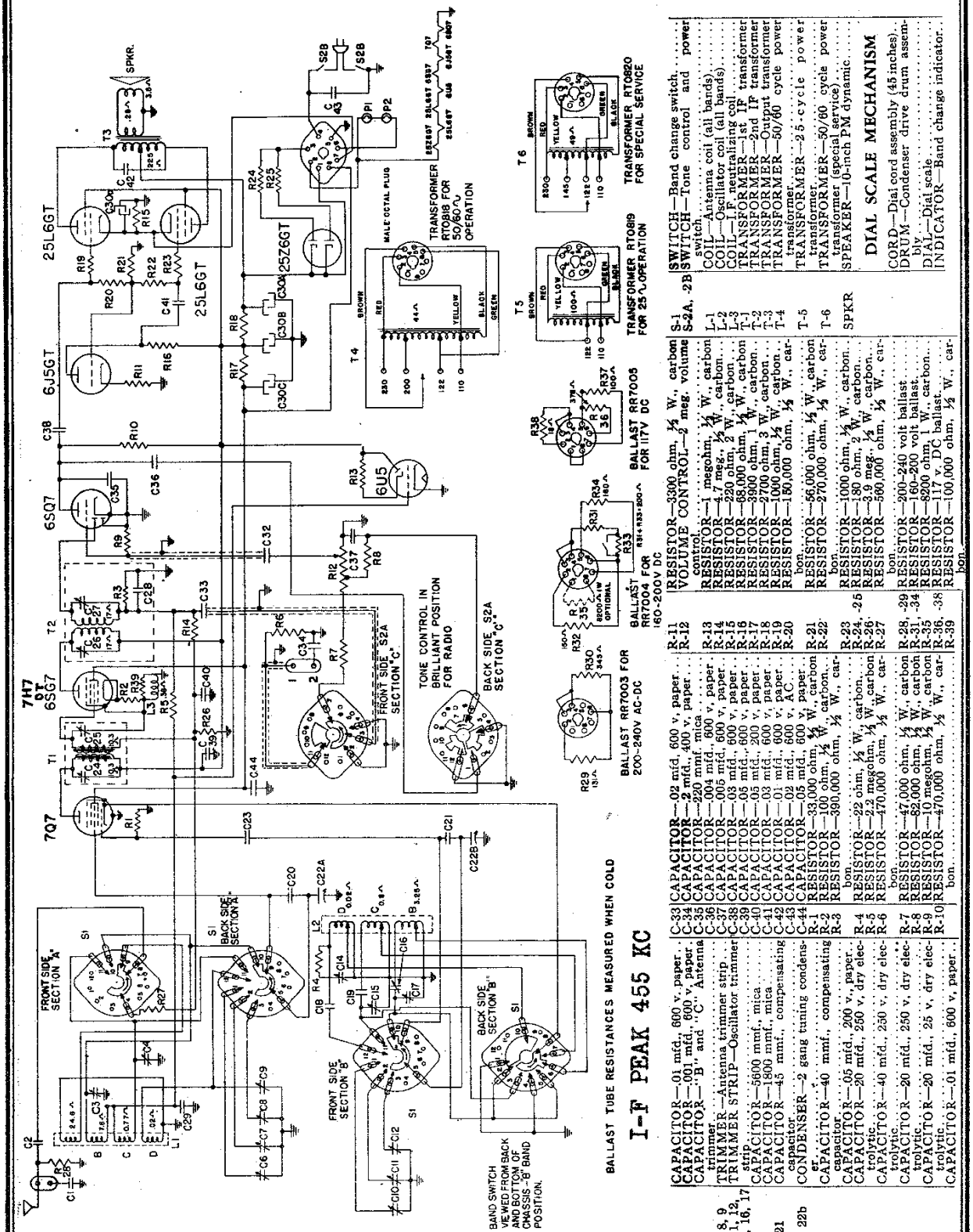
If, in operating the record player, there is appreciable hum interference, reverse the motor power-cord plug in the power-supply outlet.

TONE CONTROL SWITCH CONNECTIONS

Position in Use	Section "C" Back Side	Section "C" Front Side
Radio-Brilliant	Open	3-7
Radio-Bass	1-12	3-7
Radio-Treble	4-6	3-7
Radio-Mellow	1-12 4-6	3-7
Phono-Brilliant	Open	7-11 2-3
Phono-Bass	1-12	7-11 2-3
Phono-Treble	4-6	7-11 2-3
Phono-Mellow	1-12 4-6	7-11 3-4

MODEL X-228

GENERAL ELECTRIC CO.



C1	CAPACITOR—.01 mfd., 600 v. paper.	C-33	CAPACITOR—.02 mfd. 600 v. paper.	R-11	RESISTOR—3300 ohm, ½ W., carbon	S-1	SWITCH—Band change switch.
C2	CAPACITOR—.001 mfd., 600 v. paper.	C-34	CAPACITOR—2 mfd., 400 v. paper.	R-12	VOLUME CONTROL—2 meg. volume control.	S-2A, 2B	SWITCH—Tone control and power switch.
C3, 4	CAPACITOR—"B" and "C" Antenna trimmer.	C-35	CAPACITOR—220 mmf. mica	R-13	RESISTOR—1 megohm, ½ W., carbon	L-1	COIL—Antenna coil (all bands).
C6, 7, 8, 9	CAPACITOR—.004 mfd., 600 v., paper.	C-36	CAPACITOR—.004 mfd., 600 v., paper.	R-14	RESISTOR—4.7 meg., ½ W., carbon.	L-2	COIL—Oscillator coil (all bands).
C10, 11, 12, 14, 15, 16, 17	TRIMMER STRIP—Oscillator trimmer strip.	C-37	CAPACITOR—.006 mfd., 600 v., paper.	R-15	RESISTOR—220 ohm, 2 W., carbon.	L-3	COIL—I.F. neutralizing coil.
C-18	CAPACITOR—5600 mmf., mica	C-38	CAPACITOR—.03 mfd., 600 v., paper.	R-16	RESISTOR—68,000 ohm, ½ W., carbon	T-1	TRANSFORMER—1st IF transformer
C-19	CAPACITOR—1800 mmf., mica	C-39	CAPACITOR—.05 mfd., 600 v., paper.	R-17	RESISTOR—3900 ohm, ½ W., carbon.	T-2	TRANSFORMER—2nd IF transformer
C-20, 21	CAPACITOR—45 mmf., compensating capacitor.	C-40	CAPACITOR—.05 mfd., 200 v., paper.	R-18	RESISTOR—2700 ohm, ½ W., carbon.	T-3	TRANSFORMER—Output transformer
C-22a, 22b	CONDENSER—2 gang tuning condenser.	C-41	CAPACITOR—.03 mfd., 600 v., paper.	R-19	RESISTOR—1000 ohm, ½ W., carbon.	T-4	TRANSFORMER—50/60 cycle power transformer.
C-23	CAPACITOR—40 mmf., compensating capacitor.	C-42	CAPACITOR—.01 mfd., 600 v., paper.	R-20	RESISTOR—150,000 ohm, ½ W., carbon.	T-5	TRANSFORMER—25-cycle power transformer.
C-29	CAPACITOR—.05 mfd., 200 v., paper.	C-43	CAPACITOR—.02 mfd., 600 v., AC	R-21	RESISTOR—56,000 ohm, ½ W., carbon	T-6	TRANSFORMER—50/60 cycle power transformer (special service)
C-30a	CAPACITOR—20 mfd., 250 v., dry electrolytic.	C-44	CAPACITOR—.05 mfd., 600 v., paper.	R-22	RESISTOR—270,000 ohm, ½ W., carbon.	SPKR	SPEAKER—10-inch PM dynamic.
C-30b	CAPACITOR—40 mfd., 250 v., dry electrolytic	R-1	RESISTOR—33,000 ohm, ½ W., carbon	R-23	RESISTOR—1000 ohm, ½ W., carbon.		
C-30c	CAPACITOR—20 mfd., 250 v., dry electrolytic.	R-2	RESISTOR—100 ohm, ½ W., carbon.	R-24, 25	RESISTOR—180 ohm, 2 W., carbon.		
C-30d	CAPACITOR—20 mfd., 25 v., dry electrolytic.	R-3	RESISTOR—390,000 ohm, ½ W., carbon.	R-26	RESISTOR—3.9 meg., ½ W., carbon.		
C-32	CAPACITOR—.01 mfd., 600 v., paper.	R-4	RESISTOR—22 ohm, ½ W., carbon.	R-27	RESISTOR—560,000 ohm, ½ W., carbon.		
		R-5	RESISTOR—2.2 megohm, ½ W., carbon	R-28, 29	RESISTOR—200-240 volt ballast		
		R-6	RESISTOR—470,000 ohm, ½ W., carbon	R-31, 34	RESISTOR—160-200 volt ballast.		
		R-7	RESISTOR—47,000 ohm, ½ W., carbon	R-35	RESISTOR—8200 ohm, 1 W., carbon.		
		R-8	RESISTOR—82,000 ohm, ½ W., carbon	R-36, 38	RESISTOR—117 v. DC ballast.		
		R-9	RESISTOR—10 megohm, ½ W., carbon	R-39	RESISTOR—100,000 ohm, ½ W., carbon.		
		R-10	RESISTOR—470,000 ohm, ½ W., carbon.				

DIAL SCALE MECHANISM

CORD—Dial cord assembly (45 inches).
DRUM—Condenser drive drum assembly.
DIAL—Dial scale.
INDICATOR—Band change indicator.