

# Engineering Data

## Stromberg-Carlson No. 320 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY  
ROCHESTER, NEW YORK

### ELECTRICAL SPECIFICATIONS

Type of Circuit	-----	Superheterodyne
Tuning Ranges	-----	A—530 to 1700 Kc.; C—5900 to 18,000 Kc.
Number and Types of Tubes	-----	1 No. 6A8, 1 No. 6K7, 1 No. 6Q7G, 1 No. 6V6G, 1 No. 80
Voltage Rating	-----	105 to 125 Volts, A. C.
Input Power Frequency	-----	25 to 60 Cycles and 50 to 60 Cycles
Input Power Rating	-----	40 Watts
Frequency of Intermediate Amplifier	-----	455 Kilocycles

### APPARATUS SPECIFICATIONS

No. 320-H Receiver	-----	50 to 60 Cycles; P-28646 Chassis Assembly
No. 320-HB Receiver	-----	25 to 60 Cycles; P-28647 Chassis Assembly
No. 320-T Receiver	-----	50 to 60 Cycles; P-28646 Chassis Assembly
No. 320-TB Receiver	-----	25 to 60 Cycles; P-28647 Chassis Assembly

### CIRCUIT DESCRIPTION

These receivers are five tube superheterodyne receivers employing metal tubes and an efficient dynamic speaker. There are two tuning ranges; the frequency limits of each range are listed under the "Electrical Specifications" given above. The pilot lamp circuit is arranged so that the large tuning dial is illuminated at all times when the receiver is turned "on".

The various tubes are used in these receivers as follows: The No. 6A8 tube functions as both Modulator and Oscillator. The No. 6K7 tube is used in the I. F. Amplifier and the No. 6Q7G tube is used as the Demodulator, Automatic Volume Control and Audio Amplifier tube. The No. 6V6G tube is used in the Audio Power Output Stage and the No. 80 tube is the Rectifier tube of the power supply unit.

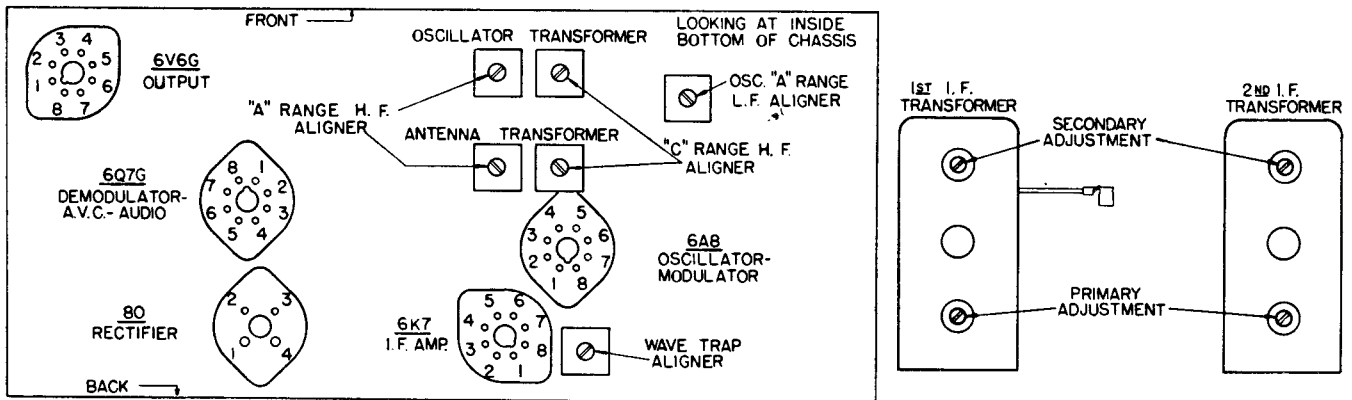


Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

### NORMAL VOLTAGE READINGS

The various values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D. C. voltages. Voltage values shown are those obtained on the lowest possible scale of a meter having the following ranges: 0-2.5, 0-10, 0-100, 0-250, 0-500, 0-1000 volts except when an asterisk appears after any given voltage value in which case the 250 volt scale was used.

Tube	Circuit	Cap	Terminals of Sockets								Heater Voltages Between Heater Terminals	
			1	2	3	4	5	6	7	8	Socket Terminal Numbers	Volts
6A8	Mod.—Osc.	0	0	0	+174	+64	-7.2	+176	<i>6.1</i>	<i>+1.8</i>	2-7	<i>6.1</i>
6K7	I. F. Amp.	0	0	0	+176	+62	+1.8	+210	<i>6.1</i>	<i>+1.8</i>	2-7	<i>6.1</i>
6Q7G	Dem.—A. V. C. —Audio	0	0	0	+65*	0	0	+65*	<i>6.1</i>	0	2-7	<i>6.1</i>
6V6G	Audio Output	—	0	0	+167	+176	0	0	<i>6.1</i>	<i>+8.2</i>	2-7	<i>6.1</i>
80	Rectifier	—	+260	258	258	+260	—	—	—	—	1-4	<i>4.8</i>

Receiver tuned to 1000 Kc., no signal. A. C. voltages are indicated by italics.

### ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no readjustments are necessary. However, should it become necessary to make any readjustments, the alignment procedure given in the following paragraphs should be carefully followed. In order to make these alignment adjustments in an easy and satisfactory manner, it is recommended that the Stromberg-Carlson P-27657 and P-27658 aligning tools be used.

To accurately align the circuits in these receivers, it is necessary to use a high grade, modulated test oscillator (Signal Generator), the output voltage of which can be varied. In conjunction with this test oscillator, a sensitive output meter should be used for determining the maximum signal voltage developed across the voice coil of the loud speaker.

In making any alignment adjustments, always adjust the test oscillator's output voltage to the minimum value where a good alignment may still be obtained. Never attempt to make any alignment adjustments using a strong signal. Before proceeding with the alignment of any circuits in these receivers be sure that the "Off-On-Tone" control knob is set for maximum treble response (position where knob is rotated from its maximum counter-clockwise position, slightly clockwise to position where set turns "on"). Figure 1, shows the location of all the aligning capacitors in these receivers.

In making any alignment adjustments on these receivers, it will not be necessary to remove the chassis from the cabinet. The aligning capacitors for the intermediate frequency circuits of these receivers are easily accessible from the rear of the receiver, and the aligning capacitors for the radio frequency circuits are easily accessible either through the bottom of the cabinet or through the bottom of the cabinet shelf depending upon the style of cabinet.

### Dial Adjustment

Before aligning the circuits of any of these receivers, the tuning dial must be properly aligned to track with the gang tuning capacitors. To check whether the dial is set correctly with respect to the gang tuning capacitor, rotate the "Station Selector" knob in a clockwise direction so that the gang tuning capacitor is set to its maximum capacity position. Then, with the gang tuning capacitor in this position, the dial pointer should center over the inside, lower right-hand border line (line immediately below the .53 megacycle calibration mark on the "Broadcast" scale).

### Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 455 kilocycles. In making these circuit adjustments always align the circuits in the order given in these instructions.

1. Rotate the Range Switch control knob to the Standard Broadcast Range position (arrow on knob pointing in direction of letters BR.).

Set the dial pointer to the extreme low frequency position on the receiver's dial. Rotate the "Off-On-Tone" control knob slightly clockwise from its most counter-clockwise position which is the "normal" position. Rotate the Volume control knob to its maximum clockwise position (maximum volume).

2. Apply between the chassis base (or ground binding post) of the receiver and the grid of the No. 6A8 modulator-oscillator tube, a modulated signal of 455 kilocycles from the test oscillator, using a 0.1 microfarad capacitor in series with the connection between the output terminal of the test oscillator and the grid of the No. 6A8 tube. Do not remove the chassis grid lead connecting to this tube. The ground (or low side) terminal of the test oscillator should be connected to either the chassis base or the ground binding post terminal.
3. Now, noting from Figure 1, the aligning capacitors for the first and second I. F. transformers, align the I. F. circuits in the following manner:

Secondary of second I. F. transformer.  
 Primary of second I. F. transformer.  
 Secondary of first I. F. transformer.  
 Primary of first I. F. transformer.

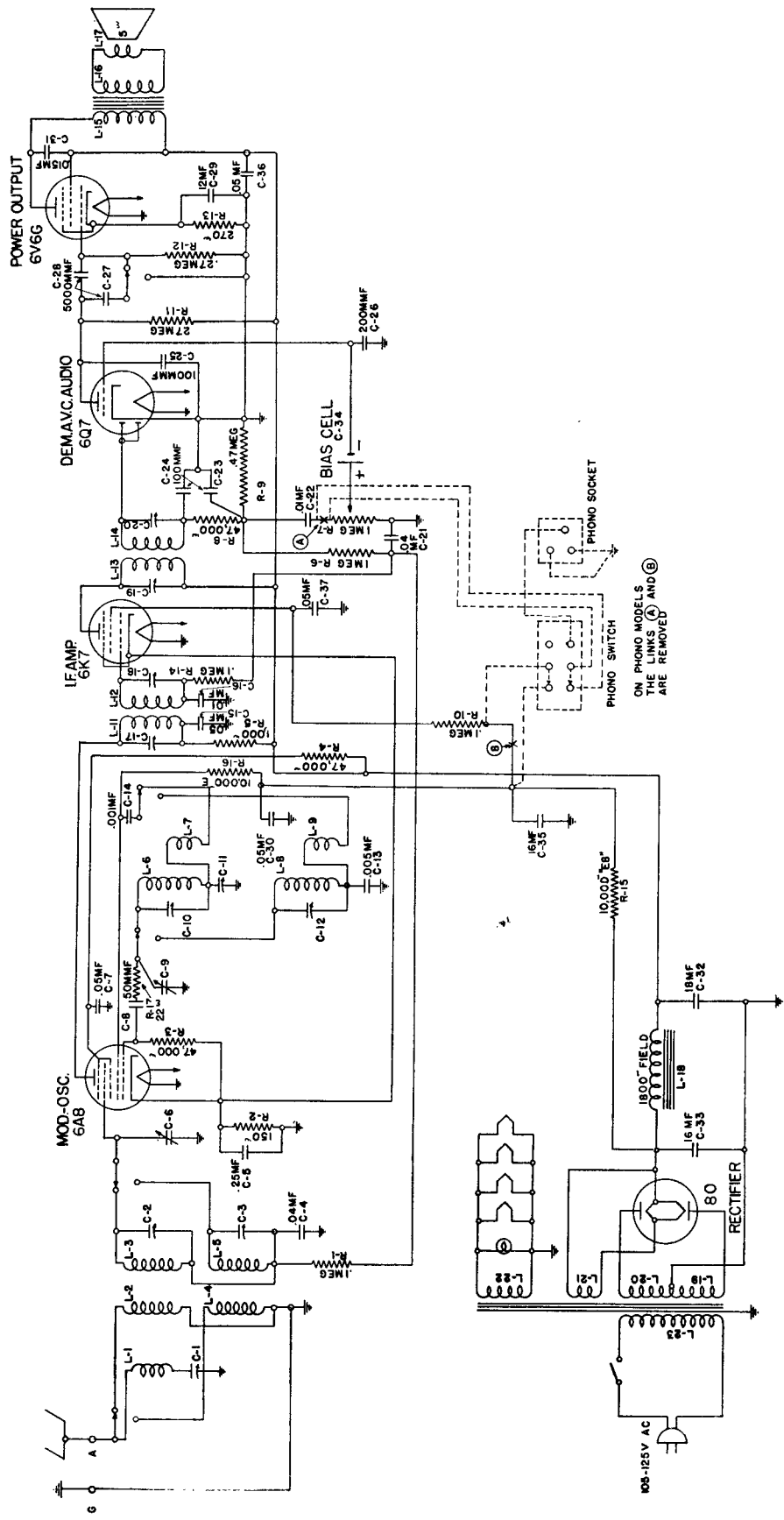


Fig. 2. Schematic Circuit of Receiver.

Adjusting the circuits to obtain maximum reading on the output meter, reducing the output of the test oscillator as required.

## Radio Frequency Adjustments

The alignment of the radio frequency circuits in these receivers should be very carefully made and in the order specified.

### Alignment of Short Wave Range (Also Referred to as "C" Range)

In aligning the radio frequency circuits for this range, replace the 0.1-microfarad capacitor which was placed in series with the test oscillator's output lead for the I. F. alignments, with a 400-ohm carbon type resistor. This lead should then be connected to the antenna binding post located on the rear of the receiver chassis. The ground terminal (or low side) of the test oscillator should be connected to the ground binding post on the receiver.

1. Rotate the Range Switch control knob to the Short Wave ("C") range position, and set the test oscillator's frequency and the receiver's tuning dial to 17 megacycles.
2. Adjust the oscillator's "C" range high frequency aligner for maximum output.

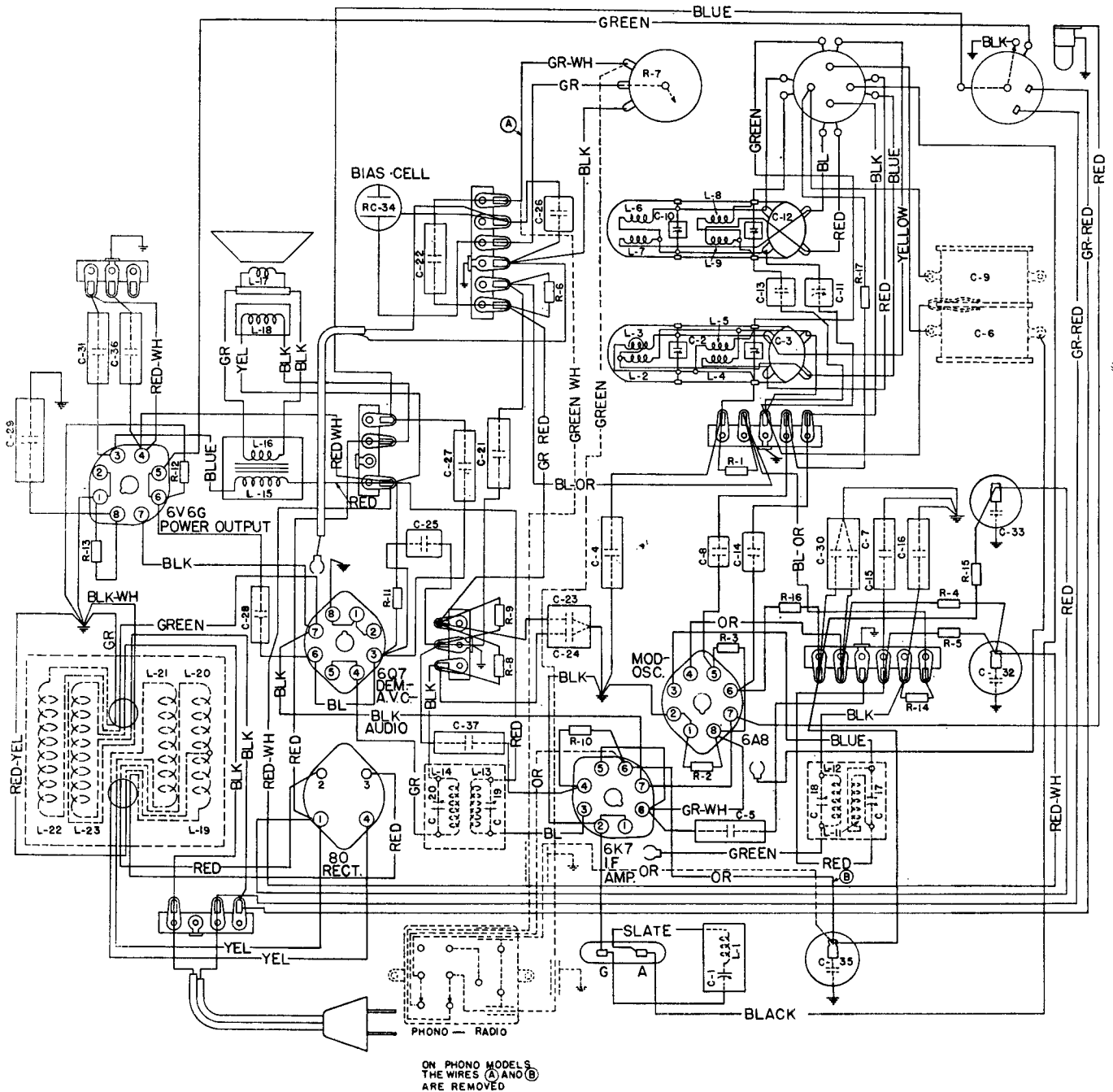


Fig. 3. Wiring Diagram of Chassis.

3. Adjust the antenna's "C" range high frequency aligner for maximum output, at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.

#### **Alignment of Standard Broadcast Range (Also Referred to as "A" Range)**

In aligning the radio frequency circuits for this range, replace the 400-ohm carbon type resistor in series with the test oscillator's output lead with a 200-micro-microfarad capacitor and align these circuits as follows:

1. Rotate the Range Switch control knob to the Standard Broadcast ("A") range position and set the test oscillator's frequency and the receiver's tuning dial to 1.5 megacycles.
2. Adjust the oscillator's "A" range high frequency aligner for maximum output.
3. Adjust the antenna's "A" range high frequency aligner for maximum output.
4. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 megacycles.
5. Adjust the oscillator's "A" range low frequency aligner (series aligner) for maximum output, and at the same time rotate the gang tuning capacitor slightly back and forth through resonance until maximum output is obtained.
6. Reset both the test oscillator's frequency and receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2 and 3.

#### **Wave Trap Adjustment**

In adjusting the wave trap circuit, set the Range Switch control knob to the Standard Broadcast range position and set the dial pointer to 1000 kilocycles.

Connect a 200-micro-microfarad capacitor in series with the output terminal of the modulated test oscillator and the antenna binding post on the receiver, and the ground terminal of the test oscillator to the ground binding post on the receiver. Then, with the modulated test oscillator set at the frequency of the intermediate amplifier, 455 kilocycles, supply a fairly strong signal to the receiver and adjust the wave trap aligner until a minimum indication is obtained on the output meter.

### **PROCEDURE FOR OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS**

In order to obtain reproduction of phonograph records in conjunction with the No. 320 Receiver, the following instructions should be followed:

To equip these receivers for phonograph operation, it will be necessary to purchase and install a Stromberg-Carlson, P-28909 Switch Assembly. The rear of the chassis base of these receivers is already drilled for mounting this switch assembly. Complete instructions on how to install and operate this switch are furnished with each P-28909 Switch Assembly.

To obtain the best quality of phonograph reproduction from these receivers, a Stromberg-Carlson Record Player is recommended. The record player is equipped with a correctly designed single record playing motor unit, and uses a crystal type pick-up in conjunction with a specially equalized circuit.

If a Stromberg-Carlson Record Player is not used and the electric pick-up to be used is of the high impedance type, it will be necessary to connect a low capacity shielded cable between the three-prong socket and plug of the P-28909 Switch Assembly and the pick-up. This shielded cable should be of the low capacity type, in order to prevent excessive cutting of high frequencies which is caused when a shielded cable having high capacity is used. The length of the shielded cable used should be kept as short as possible.

If a pick-up of the low impedance type is used, it will be necessary to connect a "matching transformer" between the three-prong socket and plug of the P-28909 Switch Assembly, and the pick-up. The transformer should be located as near to the receiver as possible, in which case it will not be necessary to use a shielded cable.

## REPLACEMENT PARTS

Piece Number	Circuit Designation	Part
17943		Spring Washer
22988		Socket, 4 Prong
24405	C4, C21	Capacitor, .04 Mfd.
24559	C25	Capacitor, Type "O", 100 Mmfd.
24994	C15, C36, C37	Capacitor, .05 Mfd.
25149	C16, C22	Capacitor, .01 Mfd.
25487	C14	Capacitor, Type "W", .001 Mfd.
25539		Socket, 8 Prong
26029	C17, C18, C19, C20	Aligning Capacitors, I. F. Transformers
26061		Switch Assembly, "Off-On-Tone" Control
26096		Cone Assembly, Loud Speaker
26114	R7	Potentiometer, Volume Control
26151	C27, C28	Capacitor, .005 Mfd.
26313	R17	Resistor, Type "E", 22 Ohms
26323	R2	Resistor, Type "E", 150 Ohms
26326	R13	Resistor, Type "E", 270 Ohms
26333	R5	Resistor, Type "E", 1000 Ohms
26345	R16	Resistor, Type "E", 10,000 Ohms
26353	R3, R4, R8	Resistor, Type "E", 47,000 Ohms
26357	R1, R10, R14	Resistor, Type "E", .1 Megohm
26362	R11, R12	Resistor, Type "E", .27 Megohm
26365	R9	Resistor, Type "E", .47 Megohm
26369	R6	Resistor, Type "E", 1 Megohm
26512	C23, C24	Capacitor Assembly, Type "WD" (2-100 Mmfd.)
27081	C1	Tuning Capacitor, Wave Trap
27101	C26	Capacitor, Type "O", 200 Mmfd.
27108	C7, C30	Capacitor Assembly (2-.05 Mfd.)
27149	L1	Wave Trap Coil
27170	R15	Resistor, Type "EB", 10,000 Ohms
27305	C8	Capacitor, Type "O", 50 Mmfd.
27538	C13	Capacitor, Type "W", .005 Mfd.
27685	C29	Electrolytic Capacitor, 20 Mfd., 25 Volts
28002	C5	Capacitor, .25 Mfd.
28025		Pilot Lamp
28594	C31	Capacitor, .015 Mfd., 200 Volts, A.C.
28652		Cord (Power Supply)
28654	C33	Electrolytic Capacitor, 16 Mfd., 300 Volts
28655	C32	Electrolytic Capacitor, 16 Mfd., 200 Volts
28656	C35	Electrolytic Capacitor, 16 Mfd., 250 Volts
28660	L2, L3, L4, L5	Coil Assembly, Antenna Transformer
28661	L6, L7, L8, L9	Coil Assembly, Oscillator Transformer
28663	L13, L14	Second I. F. Transformer
28664	L11, L12	First I. F. Transformer
28665	L15, L16	Transformer Assembly, Audio Output
28667	L17, L18	Loud Speaker Assembly
28670	C6, C9	Gang Tuning Capacitor and Bracket Assembly
28685		Range Switch
28692		Tuning Dial
28694		Pilot Lamp Socket Assembly
28695		Dial Pointer
28696	C34	Bias Cell
28787	C11	L. F. Aligning Capacitor ("A" Range)
28805	C3, C10, C12	H. F. Aligning Capacitors, Antenna and Oscillator Transformers
28806	C2	H. F. Aligning Capacitor, Antenna Transformer, "A" Range
28901	L19, L20, L21, L22, L23	Power Transformer (50 to 60 Cycles Chassis)
28902	L19, L20, L21, L22, L23	Power Transformer (25 to 60 Cycles Chassis)
29128		Large Pulley For Dial Drive
29129		Spring for Dial Drive

### MISCELLANEOUS PARTS

.....		Black Cord for Drive
27628		Felt Washer (2 Required, Used on Volume and Off-On-Tone Control Shafts)
27630		Felt Washer (Used on Station Selector Control Shaft)
27802		Knob (Used on Station Selector Control Shaft)
28827		Knob (Used on Range Switch Control Shaft)
28843		Knob (Two Required, Used on Volume and Off-On-Tone Control Shafts)