

Engineering Data

Stromberg-Carlson No. 240 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Rochester, New York

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne
Tuning Ranges	A—530 to 1700 Kc.; B—1700 to 5600 Kc.; C—5600 to 18,000 Kc.
No. and Type of Tubes	2 No. 6K7, 1 No. 6A8, 2 No. 6C5, 1 No. 6H6, 1 No. 6F5, 2 No. 6F6, 1 No. 6G5, 1 No. 5U4G
Voltage Rating	105 to 125 Volts, A. C.
Power Frequency Rating	25 to 60 Cycles and 50 to 60 Cycles
Input Power Rating:	
Radio Models Only	132 Watts
Radio-Phono. Models	165 Watts
Frequency of Intermediate Amplifier	465 Kilocycles

APPARATUS SPECIFICATIONS

No. 240-H	50 to 60 Cycles; P-27244 Chassis; P-27503 Loud Speaker
No. 240-HB	25 to 60 Cycles; P-27245 Chassis; P-27503 Loud Speaker
No. 240-L	50 to 60 Cycles; P-27244 Chassis; P-27385 Loud Speaker
No. 240-LB	25 to 60 Cycles; P-27245 Chassis; P-27385 Loud Speaker
No. 240-M	50 to 60 Cycles; P-27244 Chassis; P-27504 Loud Speaker
No. 240-MB	25 to 60 Cycles; P-27245 Chassis; P-27504 Loud Speaker
No. 240-R	50 to 60 Cycles; P-27244 Chassis; P-27385 Loud Speaker
No. 240-RB	25 to 60 Cycles; P-27245 Chassis; P-27385 Loud Speaker
No. 240-S	50 to 60 Cycles; P-27244 Chassis; P-27504 Loud Speaker
No. 240-SB	25 to 60 Cycles; P-27245 Chassis; P-27504 Loud Speaker
No. 240-W	50 to 60 Cycles; P-27244 Chassis; P-27504 Loud Speaker
No. 240-WB	25 to 60 Cycles; P-27245 Chassis; P-27504 Loud Speaker
No. 240-P	60 Cycles Only; P-27505 Chassis; P-27504 Loud Speaker
No. 240-PB	25 Cycles Only; P-27506 Chassis; P-27504 Loud Speaker

CIRCUIT DESCRIPTION

The No. 240 Receivers are eleven tube "Adjustable High Fidelity" receivers employing metal tubes. These receivers have three tuning ranges, the frequency limits of each range being listed under the "Electrical Specifications." In order to obtain maximum performance on the Standard Broadcast Range ("A" Range) of these receivers, a "signal admission control switch" is provided. This control is located on the inside rear flange of the chassis base, and has a slotted shaft which protrudes through the base so that it may be adjusted by the use of a screwdriver. When either the "B" or "C" ranges are in operation, this "signal admission control" is automatically cut out of the circuit, allowing the receiver to function at its maximum sensitivity on these two ranges. When operating in the Standard Broadcast Range, maximum sensitivity is obtained when the slotted shaft of this control is rotated to its maximum counter-clockwise position. To properly set this control, place the receiver in operation and then adjust this control so that clearest reception is obtained. The control should remain in this position. Do not readjust this control for each frequency. The above adjustment should be made in the evening if best results are to be obtained.

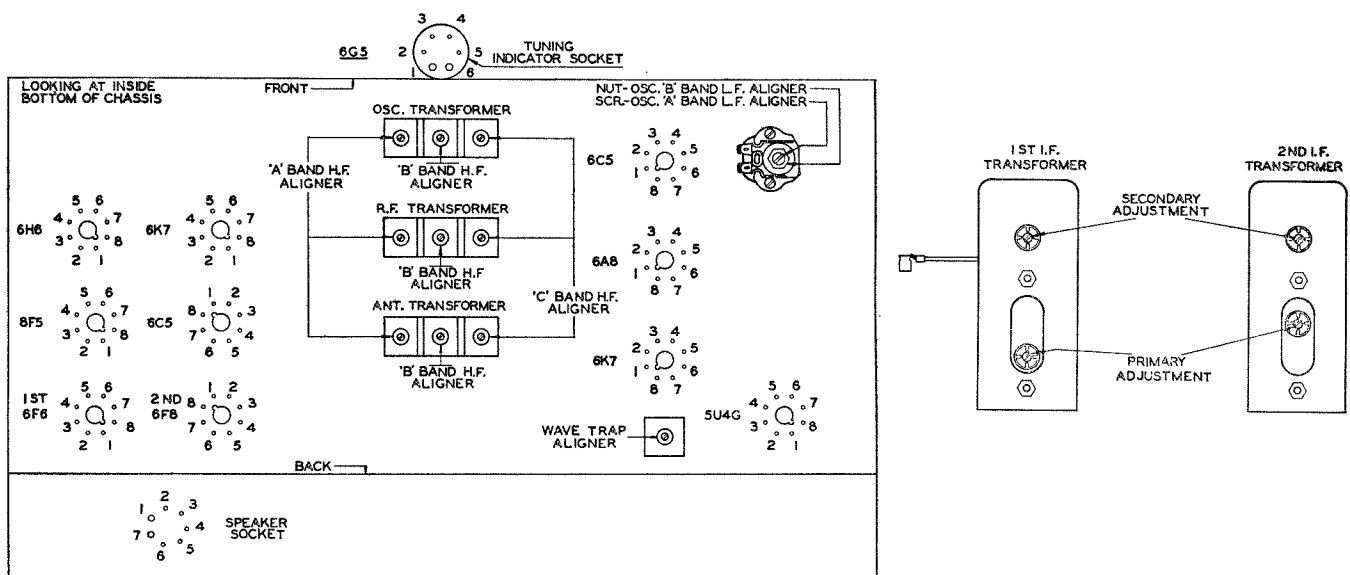


Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

When reception conditions warrant, the fidelity of this receiver can be increased by rotating the "Tone-Fidelity" switch control knob in a clockwise rotation from the normal position of this control. High Fidelity reproduction is obtained in two steps from the normal position of this control. These receivers are also provided with a low level bass frequency compensating circuit in conjunction with the volume control circuit, so that balanced reproduction is obtained for any setting of the volume control.

A metal guard frame is furnished on these receivers to prevent damage to the chassis components and also to facilitate ease of servicing should this become necessary. Do not turn the chassis over on its guard frame without first removing the tuning indicator unit which is secured to the metal guard frame. To remove the tuning indicator unit from the guard frame, first unscrew the knurled screw which holds the tuning indicator's clamp to the metal guard frame, which will then allow the tuning indicator unit to be removed from the guard frame.

The various tubes are used in these receivers as follows: One No. 6K7 tube is used in the R. F. Amplifier, and the other No. 6K7 tube is used in the I. F. Amplifier. The No. 6A8 tube is used as a Modulator tube. One No. 6C5 tube is used as the Oscillator tube, and the other No. 6C5 tube is used as the Phase Inverter tube of the audio amplifier circuit. The No. 6H6 tube is used as a Demodulator and A. V. C. tube, and the No. 6F5 tube is used in the Audio Amplifier Stage (Driver). The two No. 6F6 tubes are used in the Audio Power Output Stage. The No. 5U4G tube is the Rectifier tube of the Power Supply Unit, and the No. 6G5 tube is used for indicating resonance in the Tuning Indicator System.

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
6K7	R. F. Amp.	0	0	0	+230	+95	0	—	<i>6.1</i>	0	2-7	<i>6.1</i>
6A8	Modulator	0	0	0	+235	+95	-17	+95	<i>6.1</i>	0	2-7	<i>6.1</i>
6C5	Oscillator	—	0	0	+130	—	-17	0	<i>6.1</i>	0	2-7	<i>6.1</i>
6K7	I. F. Amp.	0	0	0	+225	+95	0	—	<i>6.1</i>	0	2-7	<i>6.1</i>
6H6	Dem.—A. V. C.	—	0	0	0	0	0	0	<i>6.1</i>	0	2-7	<i>6.1</i>
6F5	Audio Amp.	0	0	0	—	+125	+115	+125	<i>6.1</i>	+1.2	2-7	<i>6.1</i>
6C5	Audio Amp.	—	0	0	+115	+115	0	+230	<i>6.1</i>	+5.2	2-7	<i>6.1</i>
1st 6F6	Audio Output	—	0	0	+295	+300	0	0	<i>6.1</i>	+20	2-7	<i>6.1</i>
2nd 6F6	Audio Output	—	0	0	+290	+300	0	0	<i>6.1</i>	+20	2-7	<i>6.1</i>
6G5	Tuning Ind.	—	<i>6.1</i>	+2*	0	+225	0	0			1-6	<i>6.1</i>
5U4G	Rectifier	—	—	+420	—	380	—	380	—	+417	2-8	<i>4.8</i>
Speaker Socket		—	+410	0	0	+420	+420	—	+300			

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

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 aligning 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 "Signal

Admission Control" is set for the maximum sensitivity position and that the "Fidelity" control knob is set for the "normal" position. The "Off-On-Bass" control knob should also be set for the normal position. Figure 1 shows the location of all the aligning capacitors or adjustments for this receiver.

It will not be necessary to remove the chassis in these receivers from their cabinets in order to make any alignment adjustments. The alignment adjustments for the intermediate frequency circuits are accessible from the rear of the receiver, and the adjustments for the radio frequency circuits are accessible through the apertures located in the bottom metal base plate of the chassis; these apertures are easily accessible either through the bottom of the cabinet or through the bottom of the cabinet shelf, depending upon the particular style of cabinet. See Figure 2. Never align any of these receivers without having the metal base plate fastened to the chassis base.

Dial Adjustment

Before aligning the circuits of these receivers, the tuning dial must be properly aligned to "track" with the gang tuning capacitor. To check whether the dial is set correctly with respect to the gang tuning capacitor, rotate the "Rapid Station Selector" knob in a clockwise direction so that the gang tuning capacitor is set to its maximum capacity position. Then, with the receiver turned "on", the illuminated dial indicator line should be exactly centered over the dial alignment lines (black lines) which are located at the extreme low frequency end of each scale on the dial. If these lines do not center over the illuminated dial indicator line, loosen the two set screws located on the hub of the dial. Then, rotate the dial so that these alignment lines are centered over the illuminated dial indicator line. The two set screws of the dial hub should then be securely tightened.

Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 465 kilocycles. Because of the necessity of obtaining the proper shape of resonance curve of these stages in a high fidelity receiver, it is recommended that unless it is absolutely essential, these I. F. adjustments be untouched. In the factory these adjustments are made using a visual system which allows the operator to see the exact shape of the resonance curve. For this reason it is best to have these adjustments made at the factory. However, in the case where this cannot be done, the following procedure should be followed.

1. Operate the Range Switch of the receiver to the "A" range position and set the tuning dial to its extreme low frequency position. Set the "Fidelity" control knob to its "Normal" position, and the "Off-On-Bass" control knob to its normal position. **Never attempt to align the I. F. circuits of this receiver with the "Fidelity" control set at any position other than the "Normal" fidelity 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 tube, a modulated signal of 465 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.

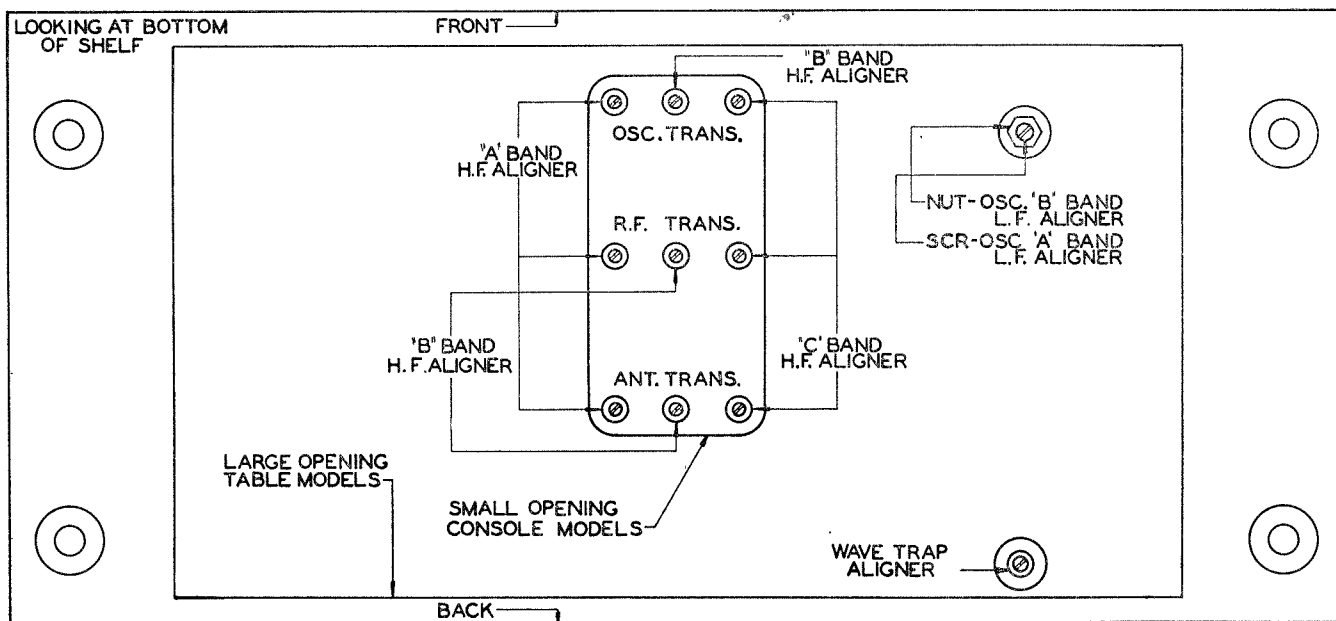


Fig. 2. View Through Chassis Mounting Shelf Showing Adjusting Screws for R. F. Aligning Capacitors.

3. Now, noting from Figure 1 the aligning adjustments 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.
 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 of the various ranges in these receivers should be very carefully made and in the order specified.

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

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. Operate the Range Switch on the receiver chassis to the "C" range position, and set the test oscillator's frequency and the receiver's tuning dial to 16 megacycles.
2. Adjust the oscillator's "C" band high frequency aligner for maximum output.
3. Adjust the R. F. interstage "C" band high frequency aligner for maximum output and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
4. Adjust the antenna's "C" band 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 Aircraft, Amateur, and Police Range (Also Referred to as "B" Band)

In aligning the radio frequency circuits for this range, use the same artificial antenna (400-ohm carbon type resistor) in series with the output terminal of the test oscillator as was used for aligning the short-wave range.

1. Operate the Range Switch on the receiver chassis to the "B" range position, and set the test oscillator's frequency and the receiver's tuning dial to 5 megacycles.
2. Adjust the oscillator's "B" band high frequency aligner for maximum output.
3. Adjust the R. F. interstage "B" band high frequency aligner for maximum output and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
4. Adjust the antenna's "B" band high frequency aligner for maximum output, and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
5. Set the test oscillator's frequency and the receiver's tuning dial to 1.8 megacycles.
6. Adjust the oscillator's "B" band low frequency aligner (series aligner), and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.
7. Reset both the test oscillator's frequency and the receiver's tuning dial to 5 megacycles and repeat operations Nos. 2, 3 and 4.

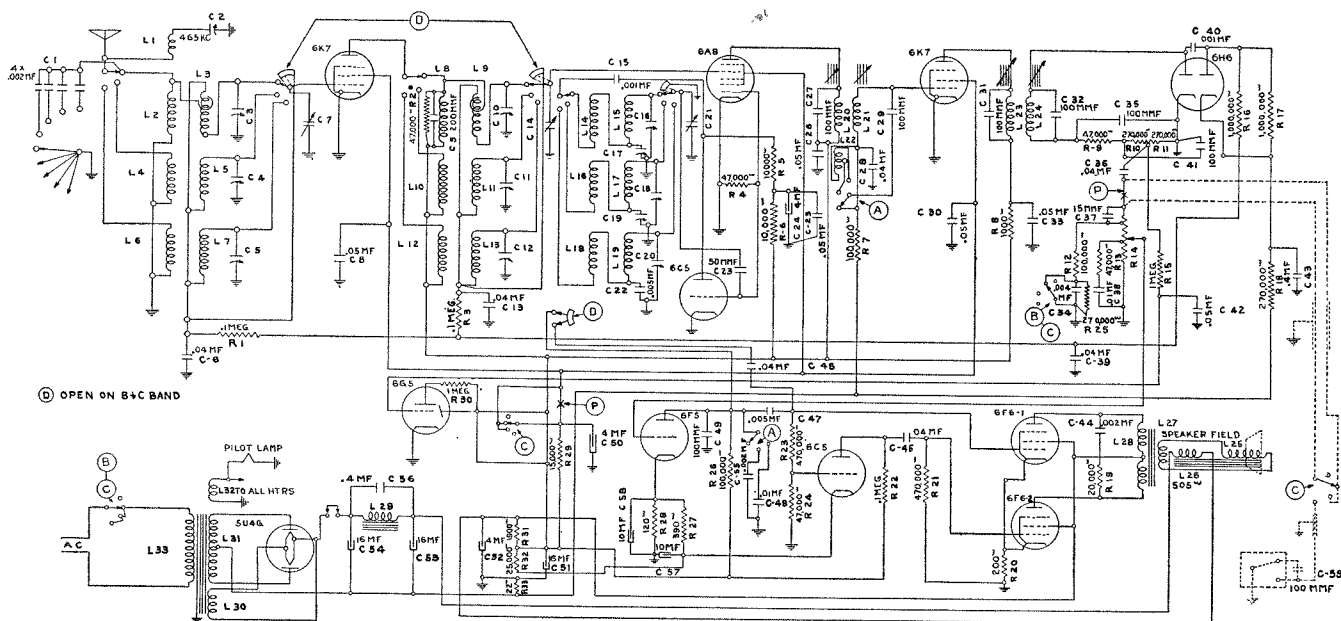


Fig. 3. Schematic Circuit of Receiver.

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

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. Operate the Range Switch to the "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" band high frequency aligner for maximum output.
3. Adjust the R. F. interstage "A" band high frequency aligner for maximum output.
4. Adjust the antenna's "A" band high frequency aligner for maximum output.
5. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 megacycles.
6. Adjust the oscillator's "A" band 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.
7. Reset both the test oscillator's frequency and receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2, 3 and 4.

Wave Trap Adjustment

In adjusting the wave trap circuit, the "Signal Admission Control" should be set for the most sensitive position (shaft rotated in the most counter-clockwise direction). Set the Range Switch of the receiver to the "A" range position and the tuning dial 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, 465 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.

8 4

REPLACEMENT PARTS

Piece Number	Schematic Circuit Designation	Part
22775	C43, C56	Capacitor, .4 Mfd.
23517	.	Tube Socket, 7 Prong
24268	.	Cord, Power Supply
24405	C6, C13, C28, C36, C39, C45, C46	Capacitor, .04 Mfd.
24560	C23	Capacitor, Type "O", 50 Mmfd.
25149	C38, C48	Capacitor, .01 Mfd.
24559	C35, C41	Capacitor, Type "O", 100 Mmfd.
25481	C55	Capacitor, .002 Mfd.
25487	C15, C40	Capacitor, Type "W", .001 Mfd.
25498	C57, C58	Electrolytic Capacitor, 10 Mfd., 25 Volts, and 10 Mfd., 25 Volts
25504	C49, C59	Capacitor, Type "2", 100 Mmfd.
25526	R29	Resistor, Type "F", 15,000 Ohms
25539	.	Tube Socket, 8 Prong
26151	C47	Capacitor, .005 Mfd.
26260	L29	Choke Assembly
26287	.	Pilot Lamp
26322	R28	Resistor, Type "E", 120 Ohms
26328	R27	Resistor, Type "E", 390 Ohms
26333	R8	Resistor, Type "E", 1000 Ohms
26345	R5, R6	Resistor, Type "E", 10,000 Ohms
26353	R2, R4, R9, R13, R24	Resistor, Type "E", 47,000 Ohms
26357	R1, R3, R7, R12, R22, R26	Resistor, Type "E", .1 Megohm
26362	R10, R11, R18, R25	Resistor, Type "E", .27 Megohm
26365	R21, R23	Resistor, Type "E", .47 Megohm
26369	R15, R16, R17, R30	Resistor, Type "E", 1 Megohm
26564	C17, C19	Capacitor, Oscillator Low Frequency Aligners
26678	.	Socket, Phono-Jack
26775	R19	Resistor, Type "F", 20,000 Ohms
27081	C2	Capacitor, Aligning
27101	C9	Capacitor, Type "O", 200 Mmfd.
27102	.	Pulley Assembly
27108	C8, C25, C26, C30, C33, C42	Capacitor, Two, .05 Mfd., 400 Volts
27110	.	Spring
27120	.	Pilot Lamp Socket Assembly
27123	C51	Electrolytic Capacitor, 16 Mfd., 300 Volts
27125	R32	Resistor, Type "F", 25,000 Ohms
27126	.	Strap Assembly
27134	L27, L28	Output Transformer
27141	.	Dial Hub Plate
27143	C3, C4, C5, C10, C11, C12, C16, C18, C20	H. F. Aligners for Antenna, R. F. and Oscillator Transformers
27148	L1	Coil Assembly, Wave Trap
27159	.	Belt
27189	L30, L31, L32, L33	Power Transformer (50 to 60 Cycles Chassis)
27190	L30, L31, L32, L33	Power Transformer (25 to 60 Cycles Chassis)
27196	.	Range Switch Assembly
27232	C7, C14, C21	Gang Tuning Capacitors
27236	.	Mask Assembly (Selectorlite Dial)
27237	.	Arm Assembly (Mask Actuator)
27238	.	Rod, Mask (Actuator)
27239	.	Dial (Tuning)
27264	L2, L3, L4, L5, L6, L7	Coil Assembly, Antenna Transformer
27265	L8, L9, L10, L11, L12, L13	Coil, Assembly, R. F. Transformer
27266	L14, L15, L16, L17, L18, L19	Coil Assembly, Oscillator Transformer
27313	.	Switch for Fidelity Control
27314	L20, L21, L22	First I. F. Transformer
27318	.	Drive Assembly
27332	.	Indicator Frame Assembly
27336	C53	Electrolytic Capacitor, 16 Mfd., 500 Volts
27337	C34	Capacitor, Type "W", .004 Mfd.
27339	.	Switch, "Off-On-Bass" (Used on Radio Models only)
27341	R20	Resistor, Flexible, 200 Ohms
27374	R31, R33	Resistor, "B" Voltage Divider
27408	.	Cable Assembly
27411	.	Clamp Assembly, Tuning Indicator
27493	C1	Capacitor Assembly; Four, .002 Mfd.
27537	C24, C50, C52	Electrolytic Capacitor, 4 Mfd., 400 Volts; 4 Mfd., 250 Volts; 4 Mfd., 250 Volts
27540	.	Switch, Signal Admission Control
27569	R14	Volume Control
27577	C37	Capacitor, Type "O", 15 Mmfd.
27622	C54	Electrolytic Capacitor, 16 Mfd., 500 Volts
27646	C44	Capacitor, .002 Mfd.
27659	L23, L24	Second I. F. Transformer
26751	.	Switch, "Off-On-Bass-Phono" (Used only on "Radio-Phono" Models)
27947	.	Cord Assembly (Used only on "Radio-Phono" Models)

MISCELLANEOUS PARTS

Piece Number	Part
27800	Knob Assembly (Used on "Volume", "Range Switch" and "Off-On-Bass" Controls' Shafts)
27801	Knob Assembly (For "Fidelity" Shaft)
27802	Knob Assembly (For "Rapid Station Selector" Control Shaft)
27803	Knob Assembly (For "Vernier Station Selector" Control Shaft)
27628	Felt Washer (Used on "Volume", "Fidelity", "Range Switch" and "Off-On-Bass" Controls' Shafts)
27630	Felt Washer (For "Rapid Station Selector" Control Shaft)

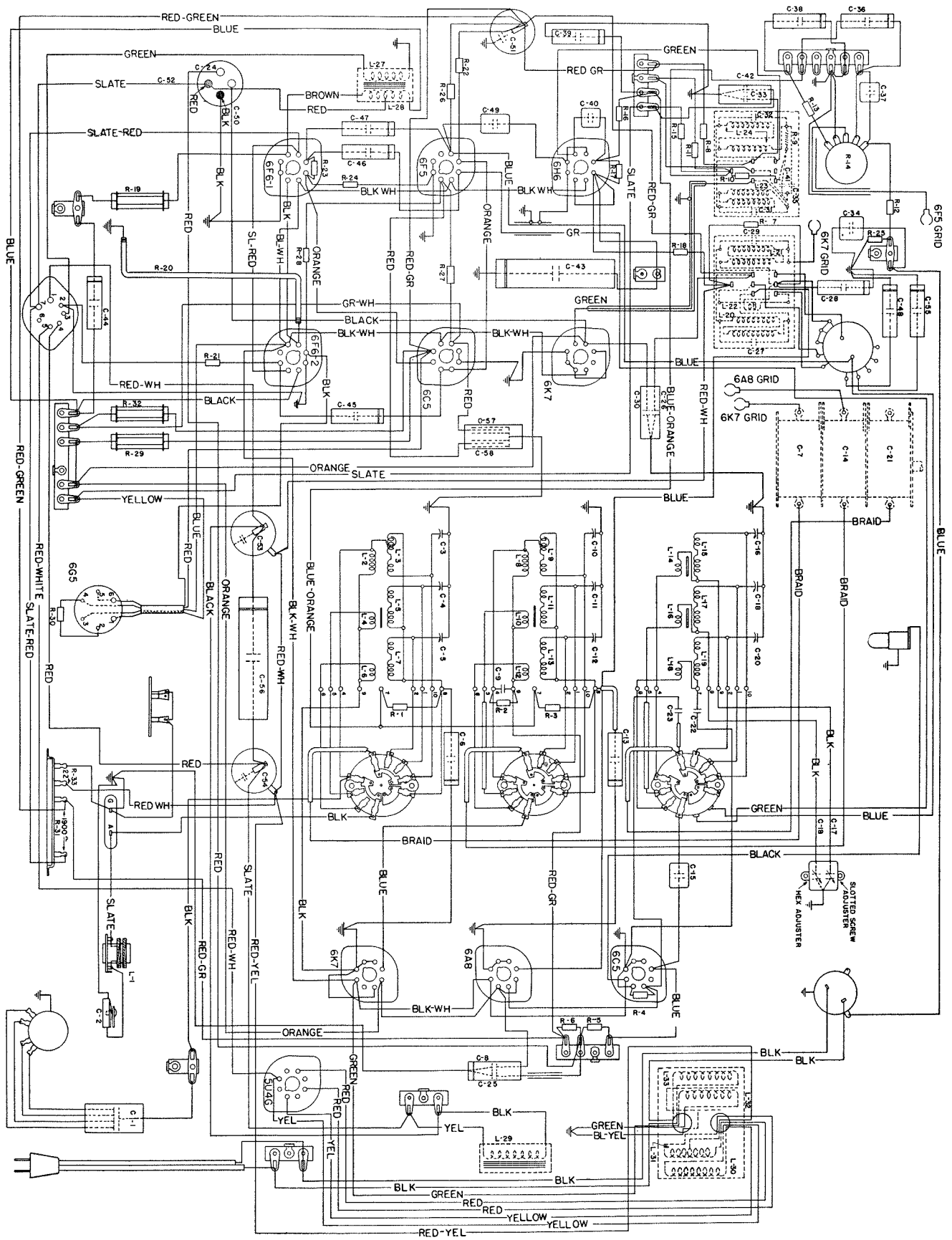


Fig. 4. Wiring Diagram, No. 240 Receiver

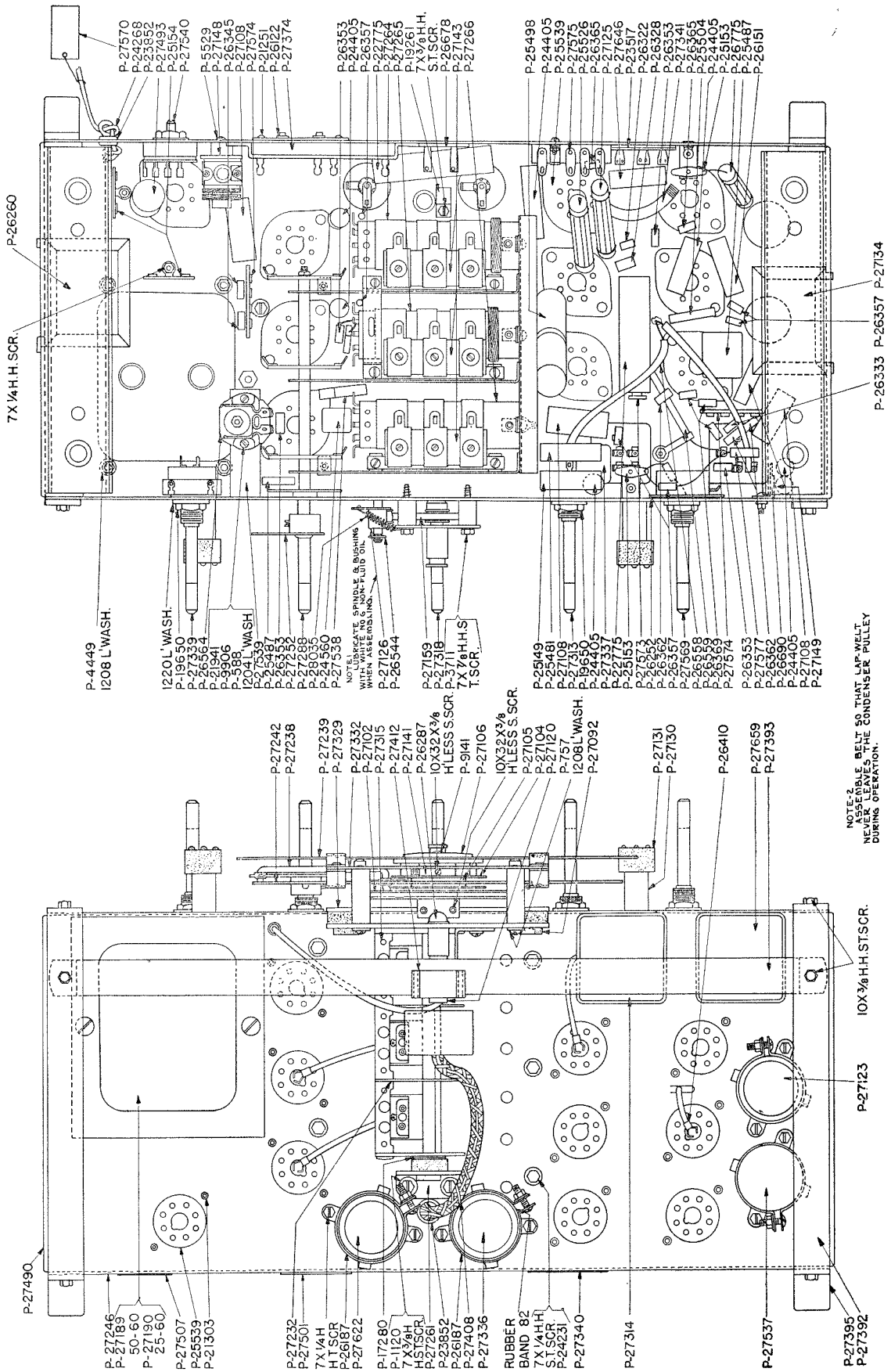


Fig. 5. Chassis Assembly.