

# Engineering Data

## Stromberg-Carlson Nos. 230 and 231 Series 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.
Number and Type of Tubes.....	1 No. 6A8, 1 No. 6K7, 1 No. 6H6, 1 No. 6F5, 1 No. 6F6, 1 No. 6G5, 1 No. 5Y4G
Voltage Rating.....	105 to 125 Volts
Frequency Rating.....	25 to 60 Cycles and 50 to 60 Cycles
Input Power Rating.....	65 Watts
Frequency of Intermediate Amplifier.....	465 Kilocycles

### APPARATUS SPECIFICATIONS

No. 230 Series:	
No. 230-H Receiver.....	50 to 60 Cycles; P-27061 Chassis; P-26171 Loud Speaker
No. 230-HB Receiver.....	25 to 60 Cycles; P-27062 Chassis; P-26171 Loud Speaker
No. 230-L Receiver.....	50 to 60 Cycles; P-27061 Chassis; P-27375 Loud Speaker
No. 230-LB Receiver.....	25 to 60 Cycles; P-27062 Chassis; P-27375 Loud Speaker
No. 231 Series:	
No. 231-F Receiver.....	50 to 60 Cycles; P-27372 Chassis; P-26170 Loud Speaker
No. 231-FB Receiver.....	25 to 60 Cycles; P-27373 Chassis; P-26170 Loud Speaker
No. 231-R Receiver.....	50 to 60 Cycles; P-27372 Chassis; P-26170 Loud Speaker
No. 231-RB Receiver.....	25 to 60 Cycles; P-27373 Chassis; P-26170 Loud Speaker
No. 231-P Receiver.....	60 Cycles only; P-27829 Chassis; P-27375 Loud Speaker; P-27835 Phonograph Unit
No. 231-PB Receiver.....	25 Cycles only; P-27830 Chassis; P-27375 Loud Speaker; P-27836 Phonograph Unit

### CIRCUIT DESCRIPTION

The Nos. 230 and 231 Series of Radio Receivers are seven tube superheterodyne 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 signal admission 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.

The volume control circuit in these receivers is arranged to give balanced reproduction at any setting of the volume control by means of a low level bass frequency compensating network.

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 chassis used in the No. 230 Receivers differ from the chassis used in the No. 231 Receivers only in the type of electrolytic filter capacitors which are used. Two wiring diagrams are, therefore, shown in this book, one for the No. 230 Receiver Chassis, and one for the No. 231 Receiver Chassis.

The various tubes are used in these receivers as follows: The No. 6A8 tube functions as both Oscillator and Modulator. The No. 6K7 tube is used in the I. F. Amplifier, and the No. 6H6 tube is used as the Demodulator and A. V. C. tube. The No. 6F5 tube is used in the Audio Amplifier Stage (Driver), and the No. 6F6 tube is used in the Audio Power Output Stage. The No. 5Y4G 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 layouts of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and an 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 scale of a meter having the following ranges: 0-2.5, 0-10, 0-100, 0-250, 0-500, 0-1000 volts.

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	+245	+100	-8	+155	<i>6.1</i>	+2.5	2-7	<i>6.1</i>
6K7	I. F. Amp.	0	0	0	+245	+100	+3	+160	<i>6.1</i>	+3	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	+250	+115	+150	+150	<i>6.1</i>	+1.7	2-7	<i>6.1</i>
6F6	Audio Output	—	0	0	+250	+255	0	0	<i>6.1</i>	+16	2-7	<i>6.1</i>
6G5	Tuning Ind.	—	0	+2.4	0	+250	0	<i>6.1</i>			1-6	<i>6.1</i>
5Y4G	Rectifier	—	0	0	<i>350</i>	0	<i>350</i>	0	+330	+330	7-8	<i>4.8</i>
Speaker Socket		—	+330	0	0	+330	+330	—	+255			

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 "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 or adjustments for this receiver.

Except in the case of making any aligning adjustments of the radio frequency circuits in the No. 231-P Receivers, it will not be necessary to remove the chassis in these receivers from their cabinets in order to make any alignment adjustments. If it is necessary to make any alignment adjustments of the radio frequency circuits in the No. 231-P Receivers, it will be necessary to remove the chassis from the cabinet. To remove the chassis in these receivers, it is only necessary to remove the two bolts which hold the chassis shelf to the cabinet. In making any radio frequency circuit alignment adjustments in the No. 231-P Receivers, the chassis should be set at approximately the same position which it occupies when in the cabinet. With the exception of the Nos. 231-F and 231-R Receivers, 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. In the Nos. 231-F and 231-R Receivers, the adjustments for the intermediate frequency circuits are accessible through the bottom of the cabinet, while the adjustments for the radio frequency circuits are not accessible until the backs of the cabinets are removed. See Figure 2. Never align any of these receivers without having the metal base plate fastened to the chassis base. In the Nos. 231-F and 231-R Receivers, it is important that the final alignment be made with the chassis mounted in the cabinet.

### 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. In making these circuit adjustments always align the circuits in the order given in these instructions.

1. Operate the "Range" switch of the receiver to the "A" range position. Set the receiver's tuning dial at its extreme low frequency position, and operate the Tone Control knob to 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 465 kilocycles from the test oscillator, using a 0.1-microfarad capa-

citor 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.

- 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.

- 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 17 megacycles.
- Adjust the oscillator's "C" band high frequency aligner for maximum output.
- 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.

- 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 five megacycles.
- Adjust the oscillator's "B" band high frequency aligner for maximum output.
- 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.
- Set the test oscillator's frequency and the receiver's tuning dial to 1.8 megacycles.

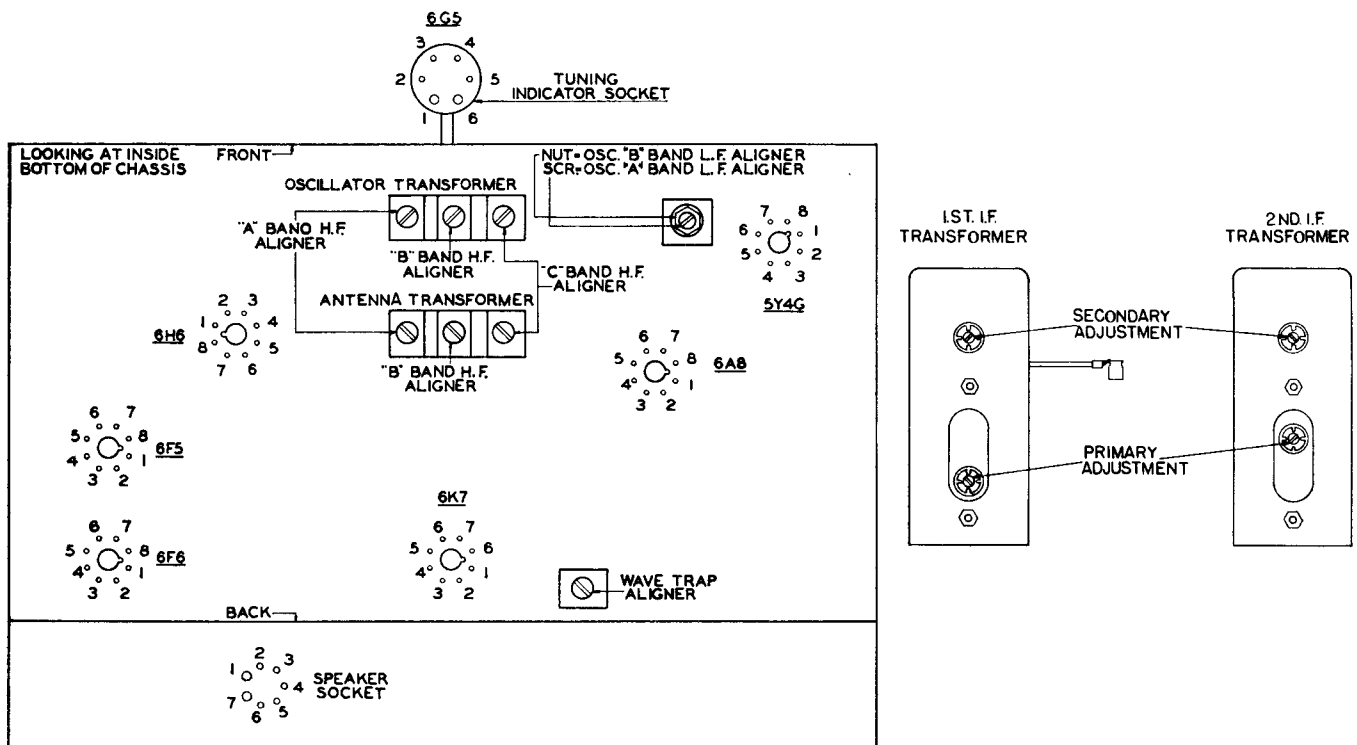


Fig. 1.—Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

5. 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.
6. Reset both the test oscillator's frequency and the receiver's tuning dial to 5 megacycles and repeat operations Nos. 2 and 3.

### 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 1.4 megacycles.
2. Adjust the oscillator's "A" band high frequency aligner for maximum output.
3. Adjust the antenna's "A" band 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" 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.
6. Reset both the test oscillator's frequency and receiver's tuning dial to 1.4 megacycles and repeat operations Nos. 2 and 3.

### 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.

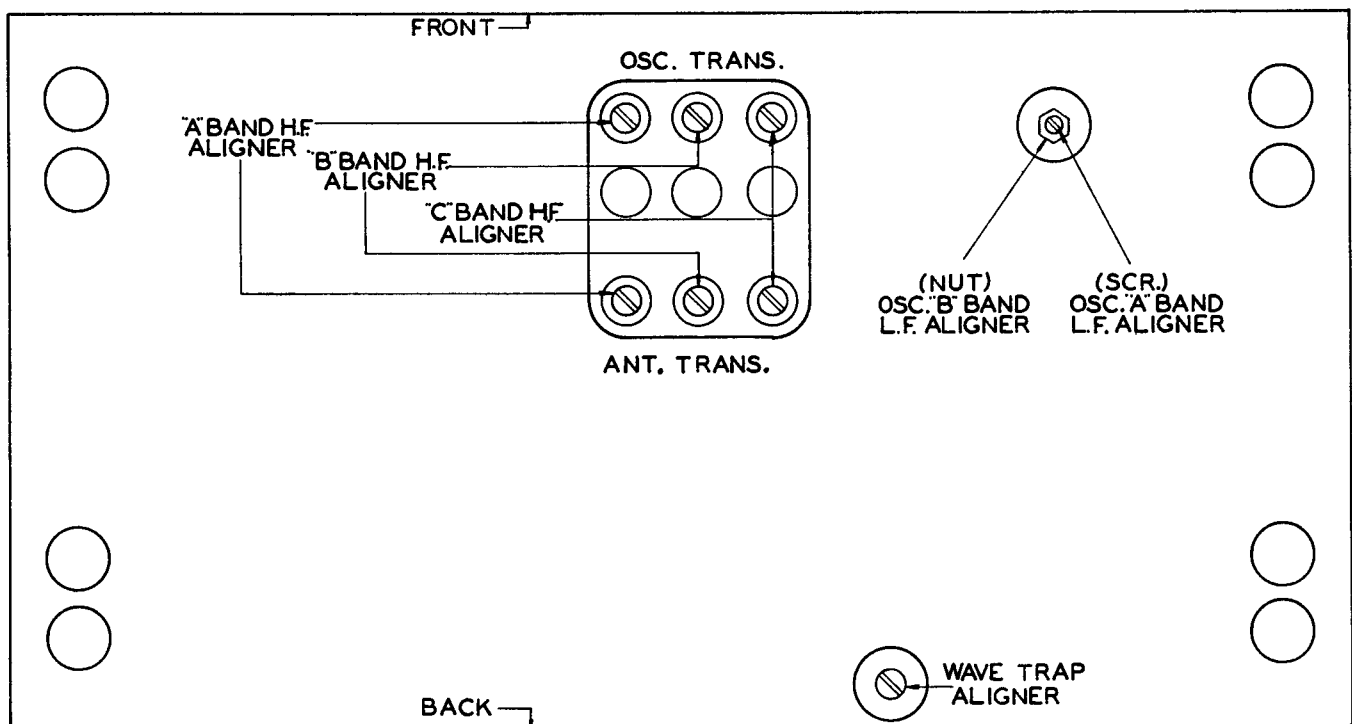


Fig. 2. View Through Chassis Mounting Shelf Showing Adjusting Screws for R. F. Aligning Capacitors.

# REPLACEMENT PARTS

Piece Number	Part
18696	Resistor, Type "R", 10,000 Ohms
23517	Socket, 7 Prong
24268	Cord (Power Supply)
24402	Capacitor, .1 Mf.
24405	Capacitor, .04 Mf.
24559	Capacitor, Type "O", 100 Mmf.
24560	Capacitor, Type "O", 50 Mmf.
24994	Capacitor, .05 Mf.
25149	Capacitor, .01 Mf.
25150	Capacitor, .02 Mf.
25487	Capacitor, Type "W", .001 Mf.
25500	Resistor, Flexible, 400 Ohms.
25533	Capacitor, .01 Mf.
25539	Socket, 8 Prong.
26114	Potentiometer (Volume Control)
26287	Pilot Lamp
26326	Resistor, Type "E", 270 Ohms
26328	Resistor, Type "E", 390 Ohms
26330	Resistor, Type "E", 560 Ohms
26345	Resistor, Type "E", 10,000 Ohms
26349	Resistor, Type "E", 22,000 Ohms
26350	Resistor, Type "E", 27,000 Ohms
26353	Resistor, Type "E", 47,000 Ohms
26357	Resistor, Type "E", .1 Megohm
26362	Resistor, Type "E", .27 Megohm
26367	Resistor, Type "E", .68 Megohm
26369	Resistor, Type "E", 1 Megohm
26544	Retainer
26564	Capacitor Assembly, L. F. Aligners ("A" and "B" Banges)
26776	Resistor, Type "F", 12,000 Ohms
26944	Capacitor, Type "W", .004 Mf.
27067	Power Transformer (50 to 60 Cycles Chassis)
27068	Power Transformer (25 to 60 Cycles Chassis)
27069	1st I. F. Transformer
27070	2nd I. F. Transformer
27073	Capacitor, Fixed Tuning, 100 Mmf.
27081	Tuning Capacitor, Wave Trap
27090	Gang Tuning Capacitor
27098	Capacitor Assembly, 1—.002 Mf.; 1—.005 Mf., (Signal Control)
27102	Pulley Assembly, Gang Tuning Capacitor
27107	Dial (Tuning)
27106	Capacitor Assembly (2—.05 Mf.)
27110	Spring (Belt Tension Adjustment)
27112	Dial Indicator Frame
27120	Pilot Lamp Socket Assembly
27122	Electrolytic Capacitor, 25 Mf., 400 Volts (Used only on No. 230 Receivers' Chassis)
27123	Electrolytic Capacitor, 16 Mf., 360 Volts (Used only on No. 230 Receivers' Chassis)

Piece Number	Part
27124	Electrolytic Capacitor Assembly, 4 Mf., 250 Volts; 12 Mf., 20 Volts (Used only on No. 230 Receivers' Chassis)
27125	Resistor, Type "E", 25,000 Ohms
27126	Arm Assembly (Belt Tension Adjustment)
27132	Transformer Assembly, Audio Output
27137	Range Switch
27144	Coil Assembly, Antenna
27145	Coil Assembly, Oscillator
27148	Coil Assembly, Wave Trap
27159	Belt (Tuning Drive)
27511	Switch, "Off-On" Switch and Tone Control
27518	Drive Shaft Assembly
27596	Thumb Screw
27598	Dry Electrolytic Capacitor, 4 Mf., and 16 Mf., 300 Volts (Used only on No. 231 Receivers' Chassis)
27599	Dry Electrolytic Capacitor, 12 Mf., 26 Volts, and 25 Mf., 400 Volts (Used only on No. 231 Receivers' Chassis)
27407	Resistor, Type "CB", 22,000 Ohms
27408	Tuning Indicator Socket and Cable
27409	Cable
27412	Clamp
27416	Switch (Signal Admission Control)
27595	Electrolytic Capacitor, 16 Mf., 250 Volts (Used only on No. 230 Receivers' Chassis)
27610	Volume Control
27611	Dry Electrolytic Capacitor, 16 Mf., 300 Volts (Used only on No. 231 Receivers' Chassis)
27615	Resistor, Type "EP", 27,000 Ohms
27685	Dry Electrolytic Capacitor, 12 Mf., 25 Volts
27782	Capacitor, .03 Mf.

## MISCELLANEOUS PARTS

27800	Knob Assembly (Used on both "Volume" and "Off-On-Tone" Controls)
27802	Knob Assembly (For "Rapid Stations Selector" Shaft)
27803	Knob Assembly (For "Vernier Stations Selector" Shaft)
27804	Knob Assembly (For "Range" Switch Shaft)
27628	Felt Washer (Used on both "Volume" and "Off-On-Tone" Controls Shafts)
27629	Felt Washer (For Range Switch Shaft)
27630	Felt Washer (For "Rapid Stations Selector" Shaft)

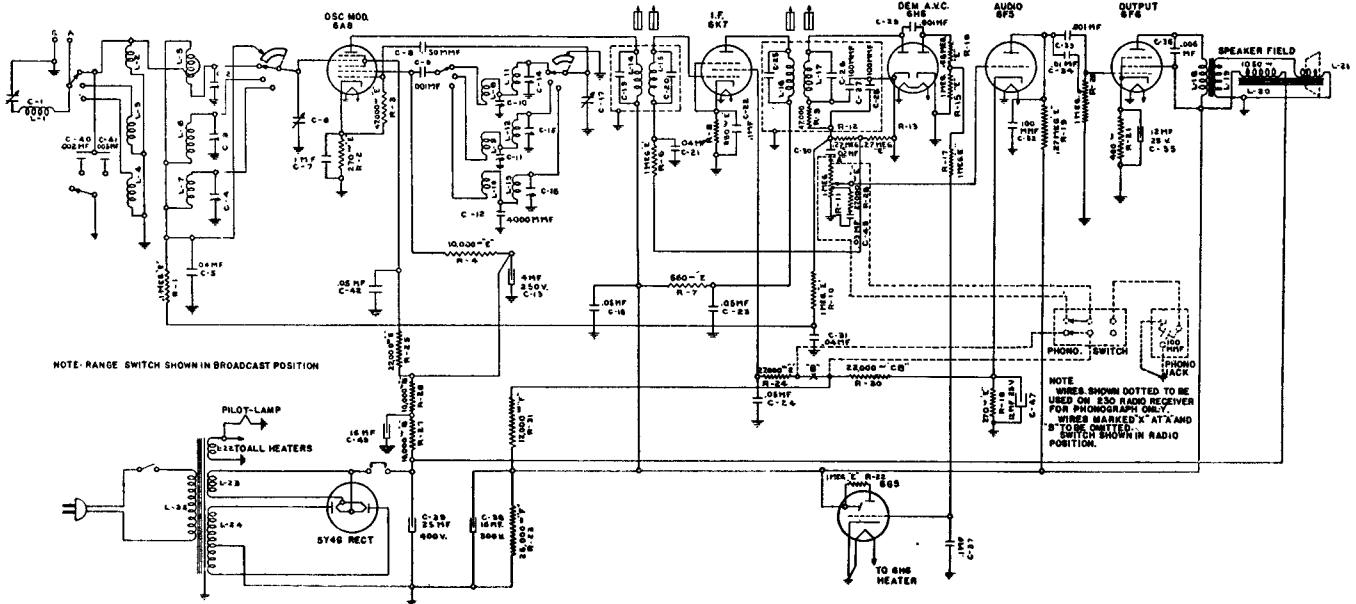


Fig. 3. Schematic Circuit of Receiver.

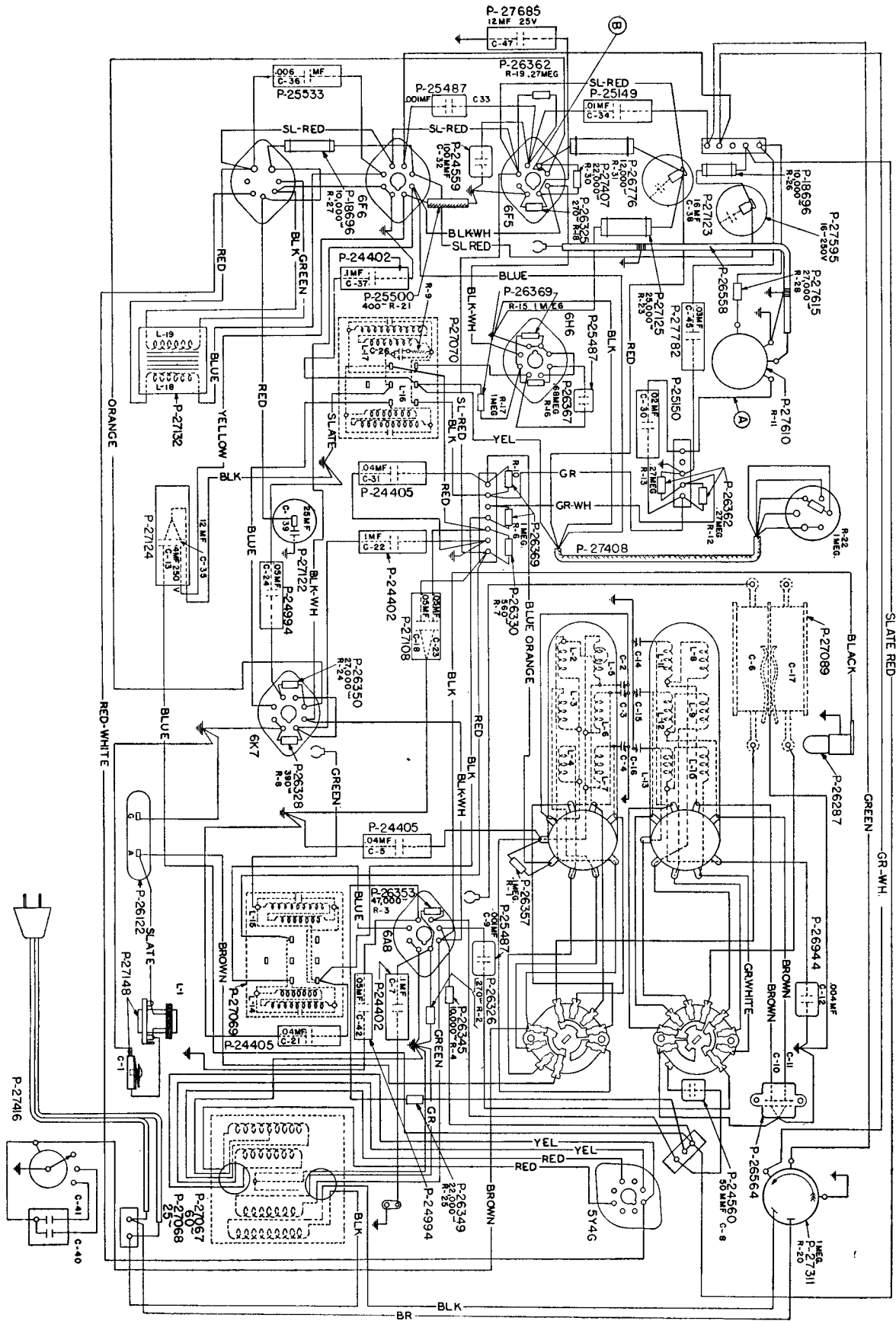


Fig. 4. Wiring Diagram, No. 230 Receiver.



