

Engineering Data

Stromberg-Carlson No. 345 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
ROCHESTER, NEW YORK

ELECTRICAL SPECIFICATIONS

Type of Circuit	Superheterodyne with Electric Tuning
Tuning Ranges	A—53 to 1.7 Mc.; B—2.25 to 7.6 Mc.; C—7.6 to 23 Mc.
Number and Type of Tubes	1 No. 6K8, 2 No. 6K7, 1 No. 6H6, 1 No. 6F5, 1 No. 6C5, 2 No. 6V6G, 1 No. 6U5, 1 No. 80
Voltage Rating	105 to 125 Volts
Power Frequency Rating	25 to 60 Cycles and 50 to 60 Cycles
Input Power Rating	85 Watts
Frequency of Intermediate Amplifier	455 Kilocycles

APPARATUS SPECIFICATIONS

No. 345-F Receiver	50 to 60 Cycles; P-29447 Chassis Assembly; P-26170 Speaker
No. 345-FB Receiver	25 to 60 Cycles; P-29448 Chassis Assembly; P-26170 Speaker
No. 345-M Receiver	50 to 60 Cycles; P-29447 Chassis Assembly; P-26170 Speaker
No. 345-MB Receiver	25 to 60 Cycles; P-29448 Chassis Assembly; P-26170 Speaker

CIRCUIT DESCRIPTION

These receivers are ten tube, instantaneous "Electric Tuning" superheterodyne receivers employing metal tubes and an efficient dynamic speaker. There are three tuning ranges, the frequency limits of each range being listed under the "Electrical Specifications", given above.

The electric tuning circuit is arranged so that eight favorite stations in the Standard Broadcast range (53 to 1.7 megacycles) may be set up for instantaneous selection by means of the push buttons. (Local and other stations that give the best daytime and evening service should be selected). To properly set up the electric tuning arrangement for the eight favorite Standard Broadcast Stations, read the section, "Instructions for Setting Up the Electric Tuning Arrangement", appearing on page 4 of this book. Manual or electric tuning for the Standard Broadcast range is easily obtainable by simply rotating the Range Switch control knob so that the arrow on the knob points in the direction of the designation for the desired type of tuning or range. When manually tuning the receiver in either the Standard Broadcast or Short Wave ranges, the electric tuning arrangement is made inoperative and the dial of the receiver is illuminated. When the Range Switch control knob is set for electric tuning (arrow on Range Switch control knob pointing in direction of the star), the dial illumination ceases and the station letters of the eight stations which are set up for electric tuning become illuminated. When manually tuning these receivers or when setting up the eight desired stations for electric tuning, resonance with a signal is indicated by means of the tuning indicator tube which operates on the cathode-ray principle.

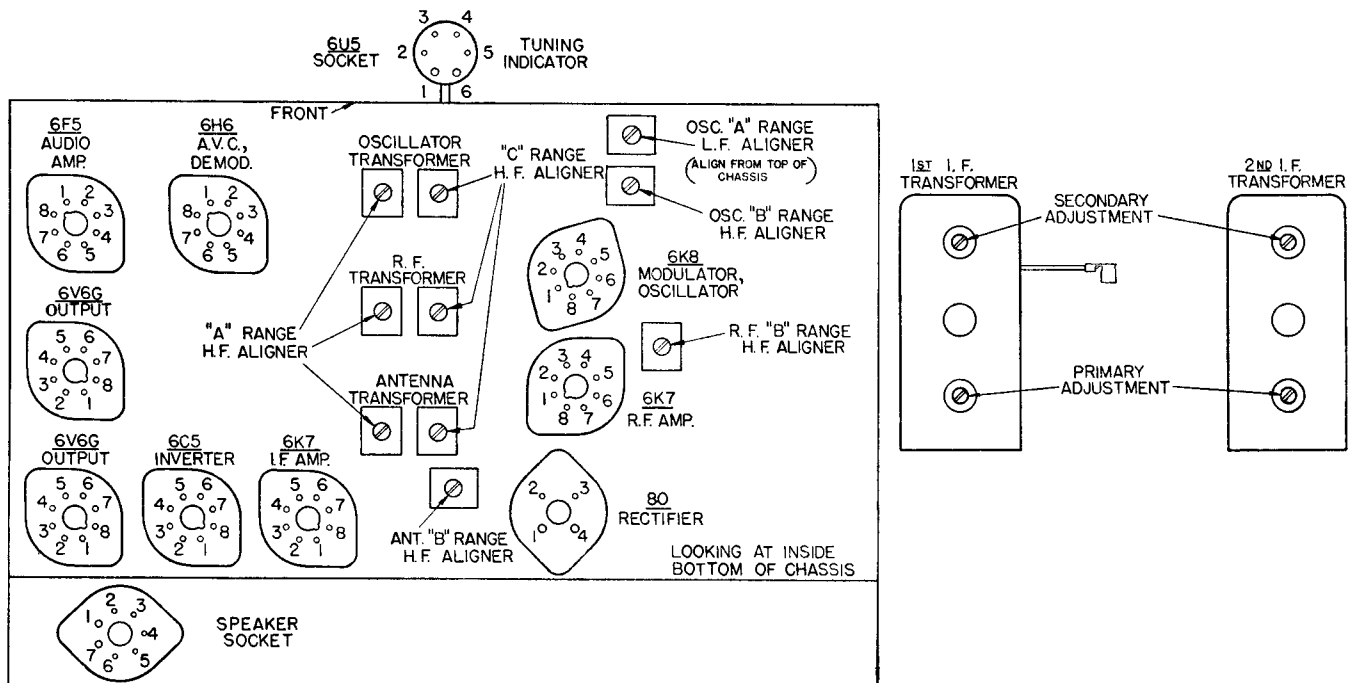


Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

A special temperature controlled compensating capacitor is used in the oscillator circuit of these receivers when operating the electric tuning arrangement in order to eliminate drift in the oscillator's frequency. 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.

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. 6K8 tube functions as both Modulator and Oscillator tube and the No. 6H6 tube functions as the Demodulator and Automatic Volume Control tube. The No. 6F5 tube is used in the Audio Amplifier and the No. 6C5 tube is used as the Phase Inverter tube of the Audio Amplifier circuit. The two No. 6V6G tubes are used in the Audio Power Output Stage. The No. 6U5 tube is used for indicating resonance in the tuning indicator system and the No. 80 tube is the Rectifier tube of the Power Supply.

NORMAL VOLTAGE READINGS

The 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 full 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 A. C.
6K7	R. F. Amp.	0	0	0	+240	+81	+2.5	+240	6.3	+2.5	2-7	6.3
6K8	Mod., Osc.	0	0	0	+215	+73	-6.0	+81	6.3	0	2-7	6.3
6K7	I. F. Amp.	0	0	0	+240	+81	+2.5	0	6.3	+2.5	2-7	6.3
6H6	Dem., A. V. C.	—	0	0	0	0	0	0	6.3	0	2-7	6.3
6F5	Audio Amp.	0	0	0	0	+83*	-1.0	+190	6.3	0	2-7	6.3
6C5	Audio Inv.	—	0	0	+105	+240	+1	-5.0	6.3	0	2-7	6.3
6V6G	Audio Output	—	0	0	+235	+240	0	0	6.3	+14	2-7	6.3
6V6G	Audio Output	—	0	0	+235	+240	0	0	6.3	+14	2-7	6.3
6U5	Tuning Ind.	—	6.3	+20*	+1	+240	0	0	—	—	1-6	6.3
80	Rectifier	—	+370	360	360	+370	—	—	—	—	1-4	4.9
Speaker Socket			—	+370	0	0	+370	+370	0	+240	—	—

Receiver tuned manually 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 re-adjustments are necessary. However, should it become necessary to make any re-adjustments, 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-24608 aligning tool 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.

IMPORTANT: In making any R. F. or I. F. 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 R. F. or I. F. circuits in these receivers be sure that the "Off-On-Tone" control knob is set for maximum treble response, and that the Electric Tuning Set-Up Switch, located on the rear of the chassis base, is rotated to the "Set-Up" position. When the aligning adjustments have been completed the Electric Tuning Set-Up Switch should be rotated back to the "Operate" position. Figure 1, shows the location of all the aligning capacitors in these receivers.

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 capacitors, rotate the "Station Selector" knob in a clockwise direction so that the gang tuning capacitors are set to their maximum capacity position. Then, with the gang tuning capacitors in this position, the dial pointer should be placed on the horizontal center line of the dial. To do this, align the pointer with the short black line located at the extreme right-hand edge of the dial plate.

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. Set the Electric Tuning and Range Switch control knob to the manual tuning Standard Broadcast range position (arrow on knob pointing in direction of letter "A"). Set the dial pointer by means of the Station Selector knobs 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. By aid of a screwdriver rotate the slotted shaft of the Electric Tuning Set-Up Switch located at the rear of the chassis base, so that the slot points in the direction of the word "Set-Up". 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. 6K8 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. 6K8 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 of the receiver.
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.

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.

CAUTION: Be sure that the Electric Tuning Set-Up Switch is set to the "Set-Up" position.

Alignment of Short Wave Range, "C"

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's 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 Electric Tuning and Range Switch control knob to the "C" Short Wave range position, and set the test oscillator's frequency and the receiver's tuning dial to 20 megacycles.
2. Adjust the receiver's oscillator "C" range H. F. aligner for maximum output.
3. Adjust the R. F. transformer "C" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.
4. Adjust the antenna "C" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.

Alignment of Short Wave Range, "B"

In aligning the radio frequency circuits for this range, use the same artificial antenna (400 ohm resistor) and antenna binding post as was used for aligning the "C" range, and align as follows:

1. Rotate the Electric Tuning and Range Switch control knob to the "B" Short Wave range position, and set the test oscillator's frequency and the receiver's tuning dial to 7 megacycles.
2. Adjust the receiver's oscillator "B" range H. F. aligner for maximum output.
3. Adjust the R. F. transformer's "B" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.
4. Adjust the antenna "B" range H. F. aligner for maximum output and at the same time rotate the gang tuning capacitors back and forth through resonance until maximum output is obtained.

Alignment of Standard Broadcast Range, "A"

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 Electric Tuning and Range Switch control knob to the manual tuning Standard Broadcast range position and set the test oscillator's frequency and the receiver's tuning dial to 1.5 megacycles.
2. Adjust the receiver's oscillator "A" range H. F. aligner for maximum output.
3. Adjust the R. F. transformer's "A" range H. F. aligner for maximum output.
4. Adjust the antenna "A" range H. F. aligner for maximum output.
5. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 megacycles.
6. Adjust the receiver's oscillator "A" range L. F. aligner (series aligner) for maximum output, and at the same time rotate the gang tuning capacitors slightly back and forth through resonance until maximum output is obtained.
7. Reset both the test oscillators frequency and receiver's tuning dial to 1.5 megacycles and repeat operations Nos. 2, 3 and 4.

OBTAINING REPRODUCTION FROM PHONOGRAPH RECORDS

These receivers are equipped with a three-contact phonograph socket, which is connected to the receiver circuit by a short, shielded cable which protrudes from the rear of the chassis base. A three-prong plug is also furnished for connecting the pick-up cable to the phonograph socket.

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.

In order to prevent radio signals from interfering with the phonograph reproduction, it is necessary to set the station selector at some point in the Short Wave range that is devoid of signals. The Record Player's turntable switch should then be pushed to the "on" position. When the turntable has attained speed, raise the pick-up and lower it gently on to the record so that the needle point enters the outside groove. The volume (sound level) and the tone for phonograph reproduction can be controlled the same as for radio reception, i. e., by means of the "Volume" and "Off-On-Tone" control knobs located on the front panel of the radio receiver.

If the 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 shielded cable between the three-prong socket plug and the pick-up. For best reproduction, this shielded cable should be of the low capacity type. The length of this shielded cable should be kept as short as possible. To connect the shielded cable to the three-prong plug, remove the metal cover of the plug and solder the shield of the cable to that prong which is farthest away from the other two prongs; a short connecting wire must also be soldered from this prong to the upper right-hand prong when looking at the rear of the plug, that is, the side opposite to the prong side. The inside wire conductor of the shielded cable should then be soldered to the other terminal of the plug.

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 plug 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.

INSTRUCTIONS FOR SETTING UP ELECTRIC TUNING ARRANGEMENT

1. Before proceeding to set up the stations for electric tuning, the radio receiver should be turned "on" for approximately twenty minutes.
2. Set the Range Switch control knob to the manual tuning position for the Standard Broadcast range (arrow on knob pointing in direction of the letter "A").
3. Remove the list of station letters from the P-28781 package assembly which is tacked inside of the cabinet.
4. Remove the three screws which hold the electric tuning escutcheon plate (metal plate). Then, remove from the escutcheon plate, the strip of transparent material and the strip of paper on which the eight stars are printed.
5. Remove the five screws which hold the electric tuning escutcheon to the front panel.
6. From the lists of stations, remove the call letters of the eight stations which it is desired to set up for electric tuning. These eight stations should preferably be selected and set up in the daytime so that the best service will be obtained at all times.

CAUTION: Each button adjustment for electric tuning has assigned frequency limits. These limits are designated for each adjustment on the cover plate which covers the electric tuning adjusting capacitors (visible when the electric tuning escutcheon is removed from the cabinet). The eight stations should be selected so that the frequency of each station will be within the assigned frequency limits of its associated push button.

It will be noted that the station letters are printed on partially cut squares to facilitate ease in removing the desired station letters. In setting up these eight favorite stations, the following order should be followed:

Looking at the front of the receiver, the station letters of the station having the highest frequency should be inserted into the farthest left-hand square of the escutcheon. Then, in successive order, according to the frequency, insert the station letters of the remaining seven stations into the other seven squares of the electric tuning escutcheon; the station letters of the station having the lowest frequency being inserted into the farthest right-hand square of the escutcheon.

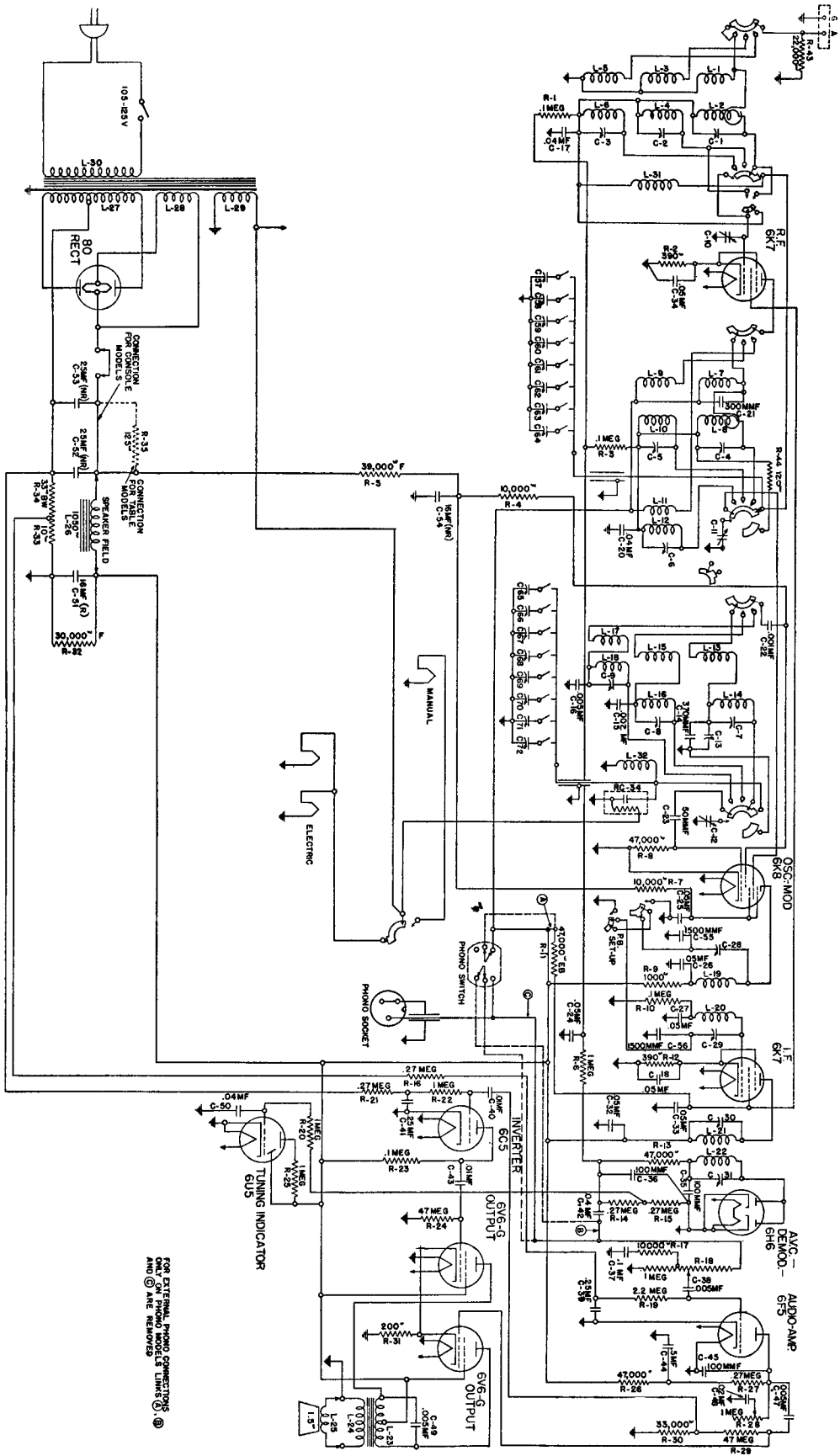


Fig. 2. Schematic Circuit of Receiver.

FOR EXTERNAL PHONO CONNECTIONS
ONLY ON PHONO MODEL LINES Ⓢ

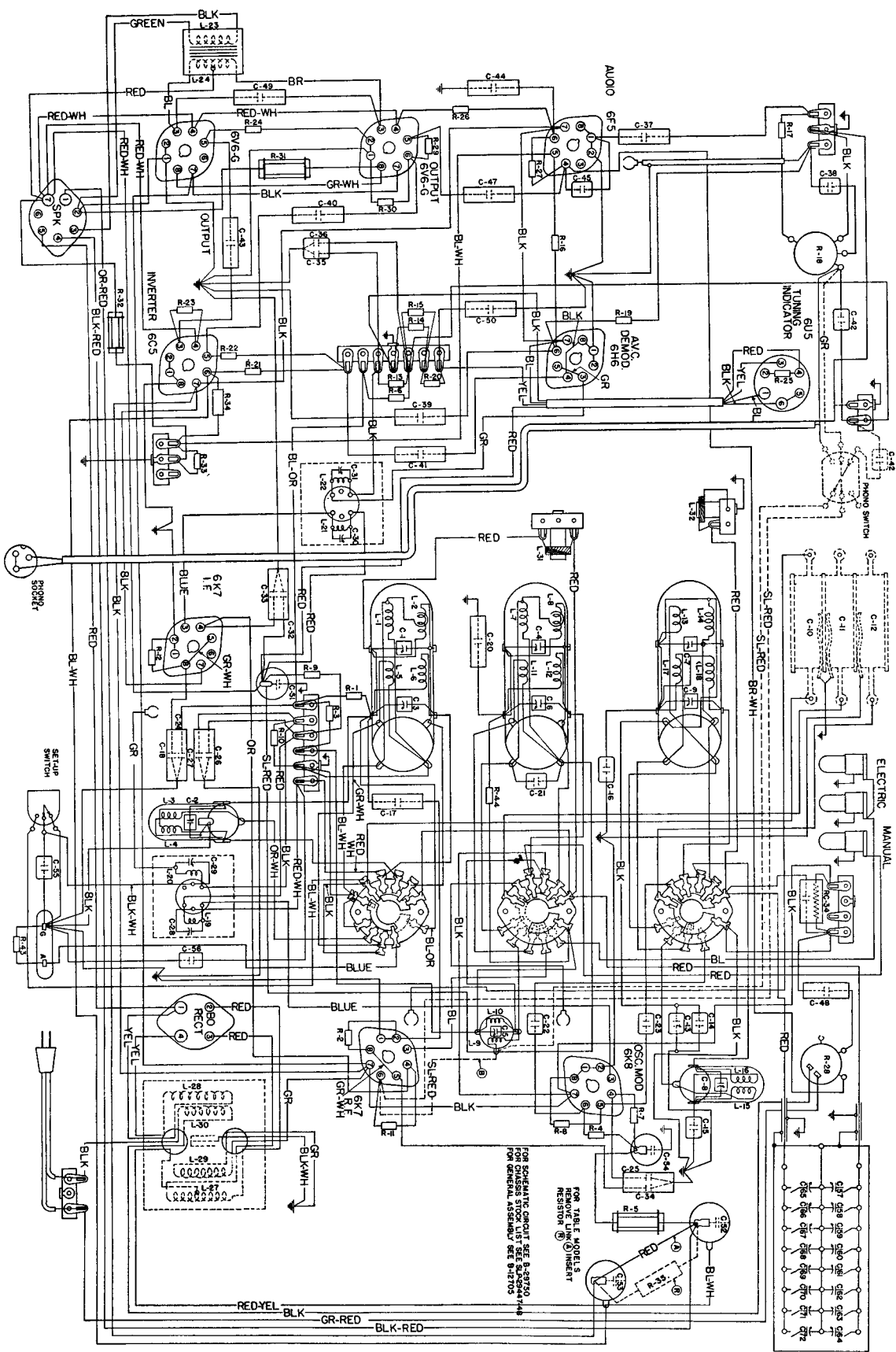


Fig. 3. Wiring Diagram of Chassis.

After the eight station call letters have been inserted into the escutcheon, the transparent strip should be replaced over the station call letters, and the escutcheon plate then fastened into its position on the electric tuning escutcheon by means of the three screws.

The tuning adjustments for the eight favorite stations can now be made, starting with the station having the highest frequency and proceeding as follows:

7. **IMPORTANT:** By aid of a screwdriver, rotate the slotted shaft of the electric tuning switch, which is located at the rear of the chassis base, so that the slot points in the direction of the word, "Set-up" (maximum clockwise rotation).
8. With the receiver turned "on", and the Range Switch control knob set to the standard broadcast position (arrow on knob pointing in direction of letter "A"), tune the receiver in the conventional manner by means of the station selector knobs to that station having the highest frequency (of the eight chosen for setting up in the electric tuning arrangement) and carefully note the program which it is broadcasting. Then, rotate the Range Switch control knob to the electric tuning position, arrow on knob pointing in direction of the small star (large star and station letters become illuminated).
9. With the electric tuning escutcheon still removed from the cabinet, push in the push button rod for the station having the highest frequency (provided, of course, that the station chosen has a frequency which is within the assigned frequency limits for this button). Now, looking in on the electric tuning unit, rotate by means of a small screwdriver, the screw of the oscillator (OSC.) tuning adjustment which is designated 1560 to 1000 kilocycles to the position where the desired station is received.

In order to check whether the program being received is from the desired station, simply rotate the Range Switch control knob to the manual tuning position (arrow on knob pointing in direction of letter "A"), and with the receiver tuned in manually to the desired station a quick check can be made; then, rotate the Range Switch control knob back to the electric tuning position. **Exact resonance with the desired station should be obtained by observing the tuning indicator.**

IMPORTANT: Always use the tuning indicator unit when setting up stations for electric tuning in order to determine when resonance with the desired station is obtained.

10. When the oscillator tuning adjustment has been properly made as mentioned in paragraph 9 above, the screw of the antenna (ANT.) tuning adjustment designated 1560 to 1000 kilocycles should be rotated to the position where exact resonance with the desired station is again obtained by observing the tuning indicator.

When these adjustments have been properly made, the station having the highest frequency is correctly set up for electric tuning selection.

11. Now proceed to set up the remaining seven stations in the same manner as mentioned in Paragraphs 7, 8, 9 and 10 above, proceeding according to the frequency of the remaining stations.
12. **IMPORTANT:** When all of the adjustments have properly been made for the eight desired stations, the slotted shaft of the electric tuning switch located on the rear of the chassis base, should be rotated so that the slot points in the direction of the word, "Operate" (maximum counter-clockwise rotation).

The electric tuning escutcheon should then be re-fastened into its position on the cabinet by means of the five special screws.

REPLACEMENT PARTS

Piece Number	Circuit Designation	Part
22988	.	Socket, 4 Prong
23517	.	Socket, 7 Prong
24402	C37	Capacitor, .1 Mfd.
24405	C17, C20, C42, C50	Capacitor, .04 Mfd.
24559	C45	Capacitor, Type O, 100 Mmfd.
25149	C40, C43	Capacitor, .01 Mfd.
25150	C48	Capacitor, .02 Mfd.
25487	C22	Capacitor, Type W, .001 Mfd.
25539	.	Socket, 8 Prong
26029	C28, C29, C30, C31	Aligning Capacitors, I. F. Transformers
26151	C47, C49	Capacitor, .005 Mfd.
26309	R33	Resistor, Type E, 10 Ohms
26322	R44	Resistor, Type E, 120 Ohms
26328	R2, R12	Resistor, Type E, 390 Ohms
26333	R9	Resistor, Type E, 1,000 Ohms
26345	R4, R7, R17	Resistor, Type E, 10,000 Ohms
26349	R43	Resistor, Type E, 22,000 Ohms
26351	R30	Resistor, Type E, 33,000 Ohms
26353	R8, R13, R26	Resistor, Type E, 47,000 Ohms
26357	R1, R3, R10, R23	Resistor, Type E, .1 Megohm
26362	R14, R15, R16, R21, R27	Resistor, Type E, .27 Megohm
26365	R24, R29	Resistor, Type E, .47 Megohm
26369	R6, R20, R22	Resistor, Type E, 1 Megohm
26373	R19	Resistor, Type E, 2.2 Megohm
26512	C35, C36	Capacitor, Type WD, (2-100 Mmfd.)
26568	C13	L. F. Aligner, Oscillator Transformer ("A" Range)
26677	.	Phono. Socket Plug
26778	C38	Capacitor, Type W, .005 Mfd.
27108	C18, C24, C25, C26, C27, C32	Capacitor Assembly (2—.05 Mfd.)
	C33, C34	Capacitor Assembly (2—.05 Mfd.)

REPLACEMENT PARTS—Continued

Piece Number	Circuit Designation	Part
27125	R32	Resistor, Type F, 25,000 Ohms
27305	C23	Capacitor, Type O, 50 Mmfd.
27311	R28	"On-Off" Switch and Tone Control
27538	C16	Capacitor, Type W, .005 Mfd.
27610	R18	Volume Control
28002	C39, C41	Capacitor, .25 Mfd.
28025		Pilot Lamp
28177	R11	Resistor, Type EB, 47,000 Ohms
28652		Cord (Power Supply)
28694		Dial Lamp Socket Assembly
28757		Tuning Drive Assembly
28805	C1, C2, C3, C4, C5, C6, C7, C8, C9	H. F. Aligning Capacitors, Antenna, R. F., and Oscillator Transformers
28810	L19, L20	First I. F. Transformer
28824		Set-Up Switch for Electric Tuning
28841	C55, C56	Capacitor, Type W, .0015 Mfd.
28849	L32	Coil Assembly, Oscillator Shunt
28858	C14	Capacitor, Type 1, 370 Mmfd.
28859	RC34	Oscillator Compensator Unit
28914	C52, C53	Electrolytic Capacitor, 25 Mfd., 400 Volts
28915	C51	Electrolytic Capacitor, 16 Mfd., 300 Volts
28945	L23, L24	Output Transformer
28956	R31	Resistor, 200 Ohms
28959		Phono. Socket and Cable Assembly
28964	L27, L28, L29, L30	Power Transformer (50 to 60 Cycles Chassis)
28965	L27, L28, L29, L30	Power Transformer (25 to 60 Cycles Chassis)
28966		Electric Tuning Cable Assembly
28996	L31	Coil Assembly, Antenna Shunt
29009	C54	Electrolytic Capacitor, 16 Mfd., 200 Volts
29088	C57 to C72	Adjustable Capacitors and Switches for Electric Tuning
29096		Pilot Lamps Socket Assembly for Station Letters
29129		Spring for Tuning Drive
29286	C21	Capacitor, Type O, 300 Mmfd.
29366	C15	Capacitor, Type W, .002 Mfd.
29370		Range Switch
29519		Electric Tuning Cable Assembly
29520	R34	Resistor, Type BW, 33 Ohms
29521	C44	Capacitor, .5 Mfd.
29525		Dial Pointer
29528	L13, L14, L17, L18	Coil Assembly, Oscillator Transformer ("A" and "C" Ranges)
29531	L7, L8, L11, L12	Coil Assembly, R. F. Transformer, ("A" and "C" Ranges)
29534	L1, L2, L5, L6	Coil Assembly, Antenna Transformer ("A" and "C" Ranges)
29549		Tuning Indicator Cable Assembly
29550	L15, L16	Coil Assembly, Oscillator Transformer ("B" Range)
29551	L3, L4	Coil Assembly, Antenna Transformer ("B" Range)
29552	L9, L10	Coil Assembly, R. F. Transformer ("B" Range)
29563	R5	Resistor, Type F, 39,000 Ohms
29569	L21, L22	Second I. F. Transformer
29613	C10, C11, C12	Gang Tuning Capacitors Assembly
29619		Large Pulley
MISCELLANEOUS PARTS		
27628		Felt Washer. Used on Volume and Off-On-Tone Controls' Shafts
27629		Felt Washer. Used on Range Switch Control Shaft
27802		Knob. Used on Rapid Station Selector Control Shaft; No. 345-M Receiver
27803		Knob. Used on Vernier Station Selector Control Shaft; No. 345-M Receiver
27804		Knob. Used on Range Switch Control Shaft; No. 345-M Receiver
28843		Knob. Used on Volume and Off-On-Tone Controls' Shafts; No. 345-M Receiver
29425		Knob. Used on Rapid Station Selector Control Shaft; No. 345-F Receiver
29426		Knob. Used on Vernier Station Selector Control Shaft; No. 345-F Receiver
29427		Knob. Used on Volume and Off-On-Tone Controls' Shafts; No. 345-F Receiver
29428		Knob. Used on Range Switch Control Shaft; No. 345-F Receiver
.....		Black Cord for Tuning Drive