

ENGINEERING DATA

STROMBERG-CARLSON NO. 505 FREQUENCY MODULATION RADIO RECEIVER AND CONVERTER

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
ROCHESTER, NEW YORK

IDENTIFICATION TABLE

Model	Input Power Frequency	Chassis	Cabinet	Speaker
505-H	50-60 Cycles	32674	31422	31451
505-HB	25-60 Cycles	32675	31422	31451

SPECIFICATIONS

Voltage Rating	105 to 125 Volts
Type of Circuit	Frequency Modulation—Superheterodyne
Tuning Range	42 to 50 Megacycles (42,000 to 50,000 Kilocycles)
Number and Type of Tubes—9	
1—6AC7 R. F. Amplifier	1—6H6 Demodulator (Discriminator)
1—6SA7 Modulator and Oscillator	1—6SF5 Audio Amplifier
1—6AB7 I. F. Amplifier	1—6F6G Output
1—6AC7 I. F. Amplifier	1—80 Rectifier
1—6SJ7 Limiter	
Input Power Rating (120 Volt line)	79 Watts
Intermediate Frequency	4.3 Megacycles (4300 Kilocycles)
Speaker Voice Coil Impedance at 400 Cycles	Approximately 5 Ohms
Speaker Field Coil Resistance	Approximately 550 Ohms

FEATURES

GENERAL. This receiver is designed for the reception of frequency modulated broadcast stations only.

The "Armstrong Wide-Swing Frequency Modulation System" used in this receiver is an outstanding development in radio. It makes possible:

1. Static-Free Reception;
Both natural and man-made static is virtually eliminated.
2. Noise free reception;
The tube and set noises present in ordinary amplitude modulation receivers are virtually eliminated.
3. Extreme high fidelity reception;
Noise free reproduction of an audio range limited only by the capacity of the human ear or the audio system of the receiver is possible without interference.
4. Interference free reception;
Two stations cannot be received at the same time.

This system is patented and Stromberg-Carlson manufactures these receivers under an Armstrong license. The Federal Communications Commission has established forty channels between 42 and 50 megacycles

for frequency modulated transmitting stations. Since this is a comparatively high frequency, the distance over which reception is possible is limited. It should also be noted that the fidelity may be limited by telephone lines, or by program transcriptions, although this condition will, undoubtedly, be improved as time goes on.

USING THE 505 RECEIVER AS A CONVERTER. This receiver may be used as a converter so that the audio system of a good high fidelity receiver of the ordinary amplitude modulation type may be utilized to provide the type of high fidelity reception only possible with frequency modulation.

It is only necessary to connect the single pin jack on the back of the chassis (labeled Frequency Modulation Sound Output Jack) to the Phono Input of any other receiver or sound system by means of the cord provided.

In this way, the speaker of the 505 Receiver will act as a "tweeter" or treble speaker and the speaker system of the amplitude modulation receiver will serve as the bass speaker. The balance between the two speakers can be controlled by operating the two volume controls.

ACCESSORIES

ANTENNA. The proper antenna for frequency modulation reception will depend upon the distance from the stations which it is desired to receive. In some locations, a simple single wire antenna will be suitable but for best results, the Stromberg-Carlson No. 6 Antenna is recommended. This antenna is designed to provide improved pick-up in the frequency modulation range.

It may also be necessary to utilize a dipole type of antenna in some locations.

PLAYING RECORDS. To obtain the best quality of phonograph reproduction, a Stromberg-Carlson record player is recommended. If this set is used as a converter, the phonograph should be attached to the amplitude modulation receiver in the regular way. (The installation of a simple switch will eliminate plugging and unplugging).

If this set is used as a receiver, the sound output jack may be readily converted to a phonograph input jack by removing the black-white wire which comes from

this jack from the terminal block to which it is connected and connecting it to the high side of the volume control (this is the terminal on the volume control to which resistor R-11 is attached).

After this has been done, it is only necessary to plug in a record player, tune to a quiet place on the dial and proceed to operate.

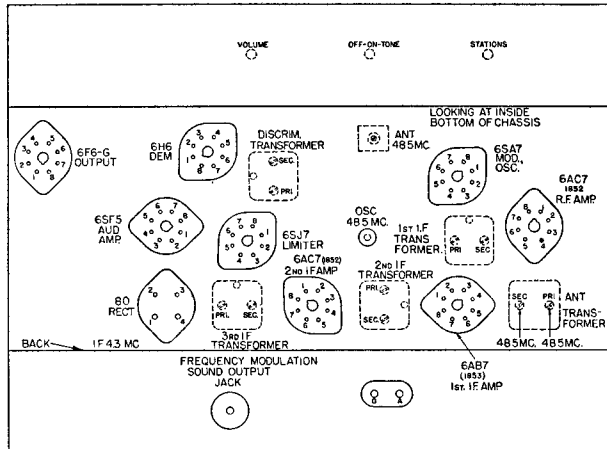
CARE OF THE CABINET. The finish of Stromberg-Carlson Cabinets should be protected by using Stromberg-Carlson Cabinet Polish regularly. It is available in pint cans designated as Pc. 28601.

Nicks and scratches of most kinds can be repaired quickly and easily by proper use of the Pc. 26962 Touch-up Kit. Complete instructions are provided with each kit.

ADJUSTING DIAL LAMP. One dial lamp is used to illuminate the dial on the No. 505 Receiver. To adjust the dial lamp for proper illumination of the dial, slide the lamp socket back and forth on its mounting bracket until maximum illumination is obtained.

ALIGNING INFORMATION

GENERAL. Never realign unless absolutely necessary. All aligning adjustments are carefully made at the factory with special equipment which is designed for aligning frequency modulation receivers. The limitations of commercial oscillographs and other



Location Chart

ordinary test equipment are such that alignment should not be attempted in the field unless absolutely necessary.

If alignment is attempted, it will not be successful unless the instructions which follow are adhered to exactly.

The following equipment will be required:

1. A good signal generator with variable output voltage. (All adjustments are made using an unmodulated signal.)
2. A good center "O" microammeter with 100 divisions on each side of "O".

Always have receiver volume control full on.

See location chart above for location of aligning adjustment screws.

I. Discriminator Adjustment.

1. Tune the set to the extreme low frequency end of the dial.
2. Connect the center "O" microammeter with a one megohm resistor in series across the whole discriminator load from the high side of R-13 to ground.
3. Connect the ground terminal of the signal generator to the ground terminal of the chassis.
4. Introduce an unmodulated signal of 4.3 megacycles to the grid (Terminal No. 4) of the 6SJ7 limiter tube using a 0.1 microfarad capacitor in series with the output lead of the signal generator. (Approximately one volt signal is necessary).
5. Adjust the secondary of the discriminator transformer for "O" reading of the microammeter.
6. Remove the microammeter and one megohm resistor from the high side of R-13 Resistor and connect them across one half of the discriminator load (from ground to the junction of the two 100,000 ohm resistors R-12 and R-13).
7. Adjust the primary of the discriminator transformer for maximum reading of the microammeter.

NOTE: To check for correct adjustment of discriminator circuit connect the center "O" micro-

ammeter across the whole discriminator load, noting that the microammeter reads "O". If a discrepancy exists it may be corrected by re-adjusting the secondary trimmer for "O" reading of the microammeter, then tune the receiver on either side of 4.3 megacycles, noting that the reading of the microammeter is approximately the same on either side of "O". If a discrepancy exists it may be corrected by adjusting the primary trimmer for maximum swing of the microammeter on either side of "O".

II. Intermediate Frequency Adjustments.

Important: All intermediate frequency adjustments are made using the same unmodulated signal of 4.3 megacycles. Each I. F. stage must be adjusted independently and in the order given. Do not make any overall adjustments after the previous stage is aligned.

1. Disconnect the jumper wire from the low side of the limiter grid resistor (R-10) and connect the microammeter directly to this wire without using the one megohm resistor.
2. Connect the output lead from the signal generator with the 0.1 microfarad capacitor in series to the grid of the 6AC7 second I. F. tube (Terminal No. 4).
3. Adjust the secondary of the third I. F. transformer for maximum reading of the microammeter.
4. Adjust the primary of the third I. F. transformer for maximum reading of the microammeter.
5. Connect the output lead from the signal generator with the 0.1 microfarad capacitor in series to the grid of the 6AB7 first I. F. tube (Terminal No. 4).
6. Adjust the secondary of the second I. F. transformer for maximum reading of the microammeter.
7. Adjust the primary of the second I. F. transformer for maximum reading of the microammeter.
8. Disconnect the green wire to the R. F. coil from the grid terminal of the 6SA7 modulator tube (Terminal No. 8), connect a 150,000 ohm resistor from Terminal No. 8 to ground and connect the output lead from the signal with the 0.1 microfarad capacitor in series to this terminal.
9. Adjust the secondary of the first I. F. transformer for maximum reading of the microammeter.
10. Adjust the primary of the first I. F. transformer for maximum reading of the microammeter.

III. Radio Frequency Adjustments.

(Leave the signal generator connected to the grid of the 6SA7 tube in the same manner as when adjusting the first I. F. transformer.)

1. Set the signal generator frequency and the receiver tuning dial to exactly 48.5 megacycles.
2. Adjust the oscillator aligning capacitor (air trimmer) for maximum reading of the microammeter.
3. Remove the output lead and the 0.1 microfarad capacitor in series with it from the grid of the 6SA7 tube and resolder in its original position the green wire which was removed from this terminal. Remove the 150,000 ohm resistor.
4. Remove the green wire from the grid of the 6AC7 R. F. tube (Terminal No. 4) and connect the output lead from the signal generator with a 0.1 microfarad capacitor in series

- with it to this terminal. Adjust the R. F. Aligning Capacitor for maximum reading of the microammeter. A slight adjustment of the oscillator (air trimmer) may also be made at this point to obtain maximum reading of the microammeter. Re-solder the green wire in its original position.
- Replace the 0.1 microfarad capacitor in series with the output lead from the signal generator with a 100 ohm carbon type resistor and connect it to the antenna terminal of the receiver.
 - Adjust the antenna aligning capacitors for maximum reading of the microammeter.

- Check for correct antenna circuit adjustment by setting the signal generator and tuning the receiver to 42 megacycles, noting that the sensitivity is approximately the same as at 48.5 megacycles. If a discrepancy exists the secondary of the antenna transformer may be adjusted to obtain maximum reading of the microammeter. Set the signal generator frequency and the receiver tuning dial to 48.5 megacycles and readjust both the primary and secondary of the antenna transformer for maximum reading of the microammeter.
- Re-solder the jumper wire to the low side of the limiter grid resistor (R-10).

NORMAL VOLTAGE READINGS

Take all readings with chassis operating and tuned to approximately 47 megacycles—no signal. Use a line voltage of 120 volts, or make allowance for any slight difference.

Use a good high resistance voltmeter having a resistance of at least 1000 ohms per volt. Take all D. C.

readings on the 500 volt scale except when an asterisk appears. Read from indicated terminals to chassis base. See location chart on Page 2 for position of terminals.

A. C. voltages are indicated by italics.

TERMINALS OF SOCKETS										
<i>Tube</i>	<i>Circuit</i>	<i>Cap</i>	1	2	3	4	5	6	7	8
6AC7	R. F. Amp.	—	0	0	0	0	+2*	+75	<i>6.3</i>	+220
6SA7	Osc. and Mod.	—	0	0	+240	+90	0	0	<i>6.3</i>	0
6AB7	1st I. F. Amp.	—	0	0	0	0	+2*	+75	<i>6.3</i>	+230
6AC7	2nd I. F. Amp.	—	0	0	0	0	+2*	+145	<i>6.3</i>	+230
6SJ7	Limiter	—	0	0	0	0	0	+50	<i>6.3</i>	+57
6H6	Demod. (Discr.)	—	0	0	0	0	-10*	0	<i>6.3</i>	0
6SF5	Audio Amp.	—	0	0	0	0	+90	+245	<i>6.3</i>	0
6F6G	Output	—	0	0	+230	+245	0	0	<i>6.3</i>	+15*
80	Rectifier	—	+300	<i>310</i>	<i>310</i>	+300	—	—	—	—

*Read on lowest possible scale of voltmeter.

CONTINUITY TEST

CAUTION: Remove all tubes and disconnect the receiver from the power supply before making continuity test.

Use a good ohmmeter capable of measuring accurately up to several megohms.

The resistances given are often approximate, owing to Electrolytic Capacitors in the circuit. When this is the case, be sure to reverse the test leads and read the highest resistance.

Read from indicated terminals to chassis base.

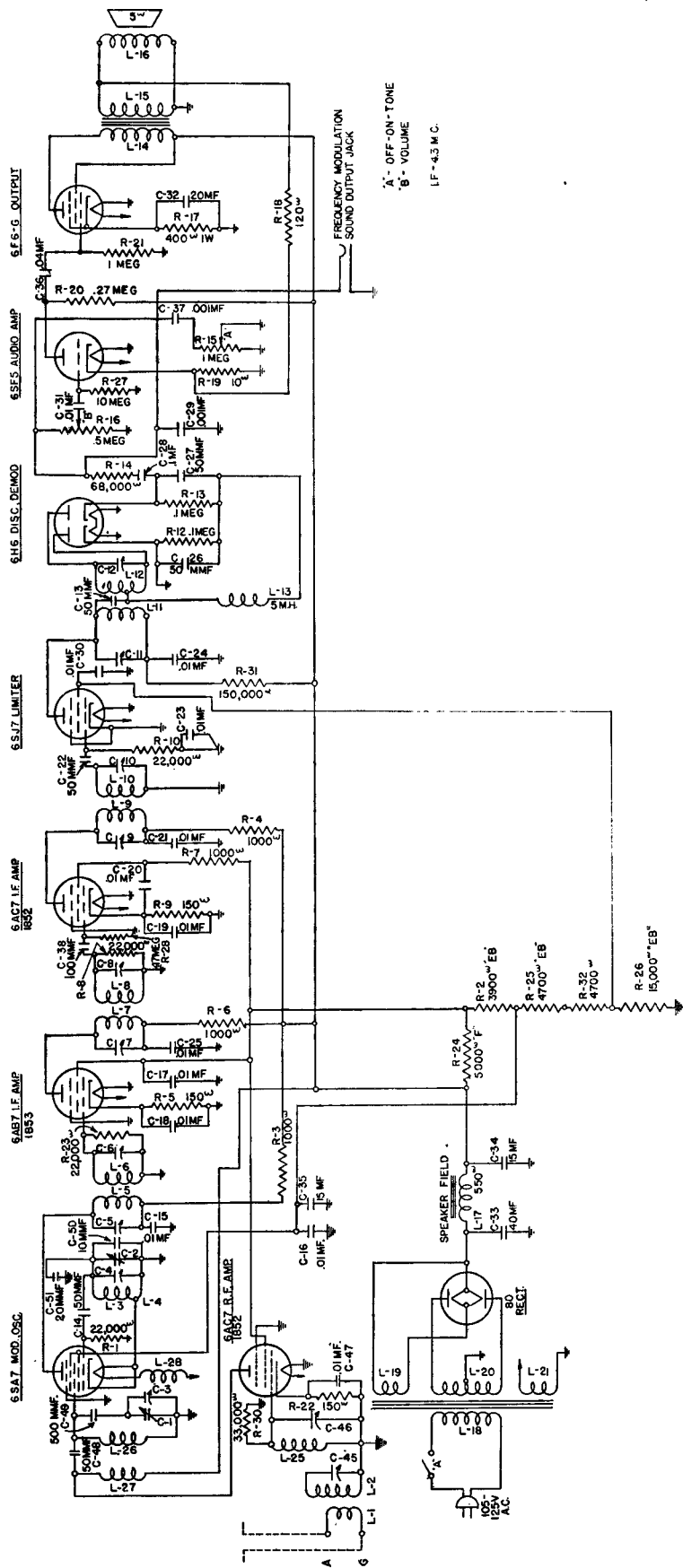
TERMINALS OF SOCKETS										
<i>Tube</i>	<i>Circuit</i>	<i>Cap</i>	1	2	3	4	5	6	7	8
6AC7	R. F. Amp.	—	S	S	S	S	150Ω	15000Ω	S	15000Ω
6SA7	Osc. and Mod.	—	S	S	30000Ω	20000Ω	20000Ω	S	S	S
6AB7	1st I. F. Amp.	—	S	S	S	2Ω	150Ω	15000Ω	S	15000Ω
6AC7	2nd I. F. Amp.	—	S	S	S	500000Ω	150Ω	30000Ω	S	30000Ω
6SJ7	Limiter	—	S	S	S	20000Ω	S	18000Ω	S	18000Ω
6H6	Demod. (Discr.)	—	S	S	90000Ω	S	90000Ω	O	S	180000Ω
6SF5	Audio Amp.	—	S	10Ω	10M	S	300000Ω	30000Ω	S	S
6F6G	Output	—	S	S	30000Ω	30000Ω	1M	O	S	400Ω
80	Rectifier	—	100Ω	30000Ω	30000Ω	100Ω	—	—	—	—

Symbols used are as follows: Ω—ohms; M—megohms; S—short; O—open.

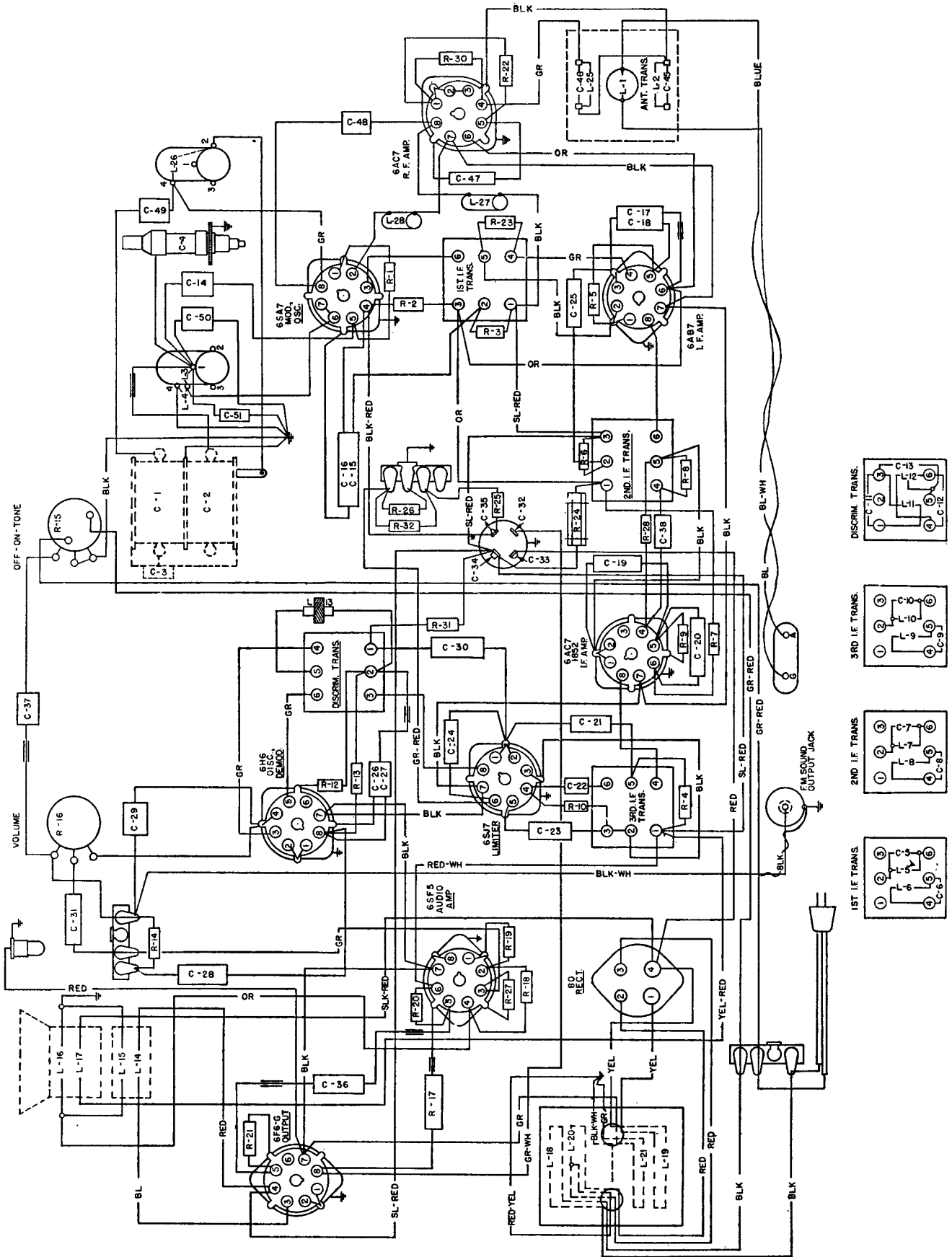
Other Tests Not Shown on Chart

Antenna terminal to chassis base----- "short"
 Ground terminal to chassis base----- "short"
 F. M. Sound Output Jack to chassis base 1 megohm

Terminals of A. C. plug to chassis base-- "open"
 Between terminals of A. C. plug:
 A. C. switch open----- "open"
 A. C. switch closed----- 6 ohms



Schematic Diagram



Wiring Diagram

REPLACEMENT PARTS

Capacitors

Piece No.	Circuit Designation	Part
24402	C-28 . . . . .	.1 mf. Capacitor
24405	C-36 . . . . .	.04 mf. Capacitor
25487	C-29, 37 . . . . .	.001 mf. Capacitor
27305	C-14, 22, 48	50 mmf. Capacitor
27999	C-26, 27	2—50 mmf. Capacitors
28568	C-38	100 mmf. Capacitor
31480	C-15, 16, 17, 18	2—.01 mf. Capacitors
31481	C-19, 20, 21, 23, 24, 25, 30, 31 . . . . .	.01 mf. Capacitor
30399	C-32, 33, 34, 35	Electrolytic Capacitor (1—40 mf., 2—15 mfs., 1—20 mf.)
32669	C-1, 2	Variable Capacitor (2 gang)
30311	C-4	Capacitor (Air Trimmer)
31377	C-51	20 mmf. Capacitor
31457	C-3, 4	Aligning Capacitor
31481	C-47 . . . . .	.01 mf. Capacitor
32806	C-50	10 mmf. Capacitor

Coils, Transformers and Speaker

30332	L-13	R. F. Choke Coil
32691	L-1, 2, 25	Antenna Coil
32677	L-26	R. F. Coil
32678	L-3, 4	Oscillator Coil
32679	L-5, 6—C-5, 6	1st. I. F. Transformer
32696	L-7, 8—C-7, 8	2nd I. F. Transformer
32698	L-9, 10—C-9, 10	3rd I. F. Transformer
32681	L-11, 12—C-11, 12	Discriminator I. F. Transformer
31437	L-18, 19, 20, 21	Power Transformer, 50/60 Cycles
31438	L-18, 19, 20, 21	Power Transformer, 25/60 Cycles
31451	L-14, 15, 16, 17	Speaker Complete with Output Transformer
30528	L-16	Cone for Speaker
31453	L-14, 15	Output Transformer
32060	L-27	R. F. Choke Coil
32687	L-28	Heater Choke Coil

Controls and Knobs

27311	R-15	Switch Off-On and Tone Control
30136	R-16	Volume Control
29297	. . . . .	Dial Drive Shaft
27668	. . . . .	"C" Washer for Dial Drive Shaft
28843	. . . . .	Knob
27628	. . . . .	Felt Washer for Knobs

Resistors

Piece No.	Circuit Designation	Part
26309	R-19	10 ohm Resistor
26322	R-18	120 ohm Resistor
26323	R-5, 9	150 ohm Resistor
26333	R-3, 4, 6, 7	1000 ohm Resistor
26341	R-32	47,000 ohm Resistor
26349	R-1, 10, 23	22,000 ohm Resistor
26351	R-30	33,000 ohm Resistor
26355	R-14	68,000 ohm Resistor
26357	R-12, 13 . . . . .	.1 megohm Resistor
26359	R-31 . . . . .	.15 megohm Resistor
26362	R-20 . . . . .	.27 megohm Resistor
26365	R-28 . . . . .	.47 megohm Resistor
26369	R-21	1 megohm Resistor
26381	R-27	10 megohm Resistor
28165	R-2	3,900 ohm Resistor
28166	R-25	4,700 ohm Resistor
28172	R-26	15,000 ohm Resistor
28758	R-17	400 ohm, 1 watt Resistor
31479	R-24	5,000 ohm, 1 watt Resistor

Miscellaneous Parts

SD-67	. . . . .	Dial Drive Cord
24135	. . . . .	Felt Foot for Cabinet
26122	. . . . .	Antenna and Ground Terminal Strip
28652	. . . . .	Power Supply Cord
28694	. . . . .	Pilot Lamp Socket Assembly
28695	. . . . .	Dial Pointer
29137	. . . . .	Pulley Assembly
29479	. . . . .	Screw for Dial Escutcheon
29628	. . . . .	Spring for Dial Drive Cord
29956	. . . . .	Pilot Lamp
30151	. . . . .	8-Prong Tube Socket
30153	. . . . .	4-Prong Tube Socket
30224	. . . . .	F. M. Sound Output Plug
30225	. . . . .	Guard for F. M. Sound Output Jack
30226	. . . . .	F. M. Sound Output Jack
30388	. . . . .	Dial Escutcheon
32683	. . . . .	Dial
31478	. . . . .	Shielded Cable for Connecting to Amplitude Modulation Receiver

Tools and Accessories

SD-29	. . . . .	Phillips No. 1 Screwdriver
24608	. . . . .	Aligning Tool
26962	. . . . .	Furniture Touch-up Kit
28601	. . . . .	Cabinet Polish (pint can)