INSTRUCTION BOOK

FOR

MODEL S-27C

RADIO RECEIVING EQUIPMENT

FOR

AMPLITUDE AND FREQUENCY MODULATED SIGNALS

FREQUENCY RANGE — 130 to 210 MEGACYCLES

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INSTRUCTION BOOK FOR MODEL S-27C RADIO RECEIVER

A. DESCRIPTION OF RECEIVER.

A-1. General:- The Model S-27C ultra-high frequency radio receiver is enclosed in a table mounting cabinet. The receiver may be removed from its cabinet and mounted directly onto a standard rack without any mechanical alterations.

A-2. Receiver Unit:- The Model S-27C receiver is an ultra-high frequency radio receiver capable of receiving amplitude and frequency modulated radio signals within a frequency range of 130 to 210 megacycles. Refer to Fig. 2 for circuit details, and to Fig. 3 for location of important parts.

The tube complement is as follows:

- V_1 - Type 954 (Acorn) first radio frequency amplifier.
- V_2 - Type 954 (Acorn) second radio frequency amplifier.
- V_3 - Type 954 (Acorn) first detector - mixer.
- V_4 - Type 6AC7 or 1852 first I.F. amplifier.
- V_5 - Type 6AB7 or 1853 second I.F. amplifier.
- V_6 - Type 6SK7 third I.F. amplifier.
- V_7 - Type 6H6 A.M. detector and automatic noise limiter.
- V_8 - Type 6AC7 or 1852 F.M. limiter.
- V_9 - Type 6H6 F.M. detector.
- V_{10}- Type 6SC7 first audio amplifier.
- V_{11}- Type 6V6 output audio amplifier.
- V_{12}- Type VR150 voltage regulator.
- V_{13}- Type 5X4G rectifier.
- V_{14}- Type 955 (Acorn) high frequency oscillator.

The circuit is that of a conventional superheterodyne receiver preceded by two stages of tuned radio frequency amplification. The intermediate frequency amplifier of the superheterodyne circuit terminates in both amplitude modulation and frequency modulation detector circuits which can be switched to the same audio amplifying system by means of the front panel AM-FM switch, thus providing either type of reception at will. Refer to Fig. 1 for block diagram. This receiver tunes through a frequency range of 130 to 210 megacycles in one band.

A-3. Circuit Description:- The signal enters the receiver through the antenna terminals and flows through the primary of the first R. F. transformer, T_1. A voltage is induced in the secondary which is then applied to the grid of the first R. F. tube V_1. Refer to Fig. 2.

The amplified signal flows through the plate circuit of V_1 and RF transformer T_2. A voltage is induced in the secondary and applied to the grid of the second R.F. tube V_2. The signal is again amplified by tube V_2 and flows in the primary of RF transformer T_3 inducing a voltage into the secondary which is connected to the mixer tube V_3.

Another voltage is applied to the cathode of V_3. This voltage is generated by the high frequency circuit of V_{14} and differs from the frequency of the received signal by 16 mc., the received signal being higher in frequency. These two signals heterodyne each other in the plate circuit of the mixer tube V_3 and produce a beat note whose frequency is equal to the difference of those of the two signals applied to the mixer tube or 16 mc. The primary of transformer T_5 is tuned to this frequency and a voltage at this frequency is thereby developed across it. This induces a voltage across the secondary of T_5 which is applied to the grid of V_4. The received signal is then amplified at the intermediate frequency through transformer T_6, tube V_5, transformer T_7 and tube V_6. Transformer T_8 couples to one of the diodes in tube V_7. The signal is here rectified and the amplitude modulation of the carrier causes a similar audio frequency signal to appear across resistors R_{33}, R_{34}, and R_{35} in series. That part of the audio frequency voltage across R_{34} and R_{35} in series is connected to the audio frequency gain control through condenser C_{48}. The voltage applied to the grids of the two triodes in parallel in the double triode V_{10} is varied by the operation of volume control R_{48}. The audio frequency voltage appearing in the plate of V_{10} is applied to the grid of V_{11}, to the tone control R_{52} and C_{51} and to the headphone jack J_1. The output of tube V_{11} flows through transformer T_{10}. The secondary of this transformer has a 5000 ohm winding with a tap at 500 ohms.

The voltage applied to the grid of tube V_6 is also applied to V_8. This tube acts as a limiter, which means the signal voltage appearing across its plate circuit is limited to a certain pre-determined value. Amplituded modulation of the carrier, whether intentional or caused by static or other forms of interference is thus effectively reduced. Frequency modulation of the carrier, however, is unaffected. The amplituded limited signal voltage appears across the primary of transformer T_9 and voltage is induced in the secondary of this transformer which reacts with the voltage coupled from the primary through condenser C_{40} to produce frequency discriminating action. When the frequency of the signal flowing through T_9 is exactly 16 mc the voltages across resistors R_{45} and R_{46} are equal and opposite. A change in the frequency in one direction produces a positive difference between the voltage across R_{45} and R_{46}. A frequency change in the opposite direction produces a negative voltage difference. In

this way frequency modulation of the received carrier produces a similar audio frequency voltage across resistors R_{45} and R_{46}. This is applied through the high frequency de-emphasis network R_{47}, C_{47} to audio frequency volume control R_{48}. From here it feeds into the audio frequency amplifier as previously outlined.

The other diode in V_7 is used as an automatic noise limiter to reduce the amplitude of sharply peaked interference when receiving amplitude modulated signals. This greatly increases the intelligibility of such reception in the presence of undesirable noise, such as that caused by ignition equipment. The power supply line cord feeds through the filter network C_{66}, L_2, C_{65} and C_{67}, L_3 and C_{64} before connecting to the primary of the power transformer. This filter effectively eliminates interference feeding into the receiver from the power supply mains. The output of the rectifier V_{13} is filtered by means of iron core reactors L_4 and L_5 and filter condensers C_{54}, C_{55}, C_{56}, C_{57} and C_{58}. The voltage regulator tube V_{12} is connected to the output of the power supply through resistor R_{56} and furnishes constant voltage to the plate supply of high frequency oscillator V_{14}, the screen and plate supply of mixer tube V_3 and the screen of V_5. The S meter M_1 used for indicating the strength of the carrier input is connected in the plate circuit of V_5. An increase in carrier strength increases the automatic volume control voltage supplied to this tube which in turn reduces the plate current, thus causing a change in the reading of meter M_1.

This same meter is connected through a high resistance R_{43} across resistor R_{45} and R_{46} in the FM position. When the receiver is tuned to the FM carrier this meter will indicate "0". Any slight deviation in the tuning from this point will cause the S meter to deflect in either direction.

B. INSTALLATION.

B-1. Caution:- The voltages exposed at the bottom of the receiver chassis are high, and care must be taken so that the operators hands do not contact any of the circuit connections during adjustment. Before making repairs requiring work underneath the receiver chassis the power cord should be removed from the supply receptacle.

B-2. Unpacking:- Carefully unpack and inspect the receiver for any possible damage during shipment. In case of damage a claim should be filed immediately with the transportation company.

B-3. Installation:- After the set has been unpacked and before it is connected to its source of power be sure that all tubes, especially Acorn tubes, are firmly positioned in their sockets. The Acorn tubes can be reached by removing the cover of the R.F. assembly which is held in place by eight knurled nuts. This receiver has been designed to operate on 115 or 230 volts, 50 to 60 cycle alternating current, by selecting the proper tap on transformers T_{11} and T_{12}. To the receiver will be attached a tag showing the operating voltage at which the transformers have been set at the factory. If the available power supply voltage does not conform to that shown on the tag, the receiver should be removed from the cabinet and lead No. 1 on transformer T_{11} and lead No. 2 on transformer T_{12} should be changed over to the terminals which correspond to the supply line voltage. Refer to Fig. 7 for details.

Appearing on the rear apron of the chassis of the receiver will be found the 5000 ohm and 500 ohm terminal strips. A permanent magnet 5000 ohm speaker should be connected to the 5000 ohm terminals. The 500 ohm terminals can connect to a transmission line or other load of that impedance value. A recessed AC power receptacle is provided into which plugs the power cord.

A socket into which will plug a standard two prong plug is connected in parallel with the standby switch on the receiver. Use of this socket is suggested should you wish to control the receiver with an external switch or relay. The two fuse holders contain two 3A-250 volt fuses. (Littelfuse type 3AG)

The octal socket into which is inserted a shorting plug is the "DC Operation" socket. As indicated on the schematic (Fig. 2), the shorting plug must remain in the socket for conventional AC operation. When the receiver is to be powered either by external batteries, or a battery vibrapack combination, this plug must be removed. A similar plug which is wired to the DC source as indicated in the schematic (Fig. 2) is then inserted in the socket and the receiver can be placed in DC service.

B-4. Antenna:- Refer to Fig. 4. This figure shows several typical antenna installations. The antenna input circuit gives maximum energy transfer when coupled to a transmission line of 75 to 100 ohms, but will operate with slight loss in sensitivity with line surge impedance up to 400 ohms.

The 130 to 210 megacycle tuning range of the Model S-27C Receiver includes a section of the ultra-high frequency portion of the radio spectrum in which wave propagation differs from that experienced on the lower frequencies.

Signals which will be received on the S-27C will travel from the transmitting antenna to the horizon, losing strength as they go in accordance with the inverse square law which means that if a signal has a certain strength

at one mile it will have only one quarter that strength at two miles. This law is followed out to the horizon from the transmitting antenna. Unlike lower frequency signals which follow the curved surface of the earth, ultra-high frequency signals past the horizon distance from the transmitting antenna decay rapidly. In addition, the higher the frequency of the signal the faster will be its rate of decay beyond the horizon.

At this point it will be readily apparent that the higher our transmitting antenna, the greater will be the effective range of the transmitter. Conversely the height of the receiving antenna is equally important in extending the "horizon range" of the particular transmitter to which the receiver is tuned. Another important reason for placing the receiving antenna as high as possible is that the antenna is then removed from the field of objectionable electrical interference near the surface of the earth.

The relationship of horizon in feet with antenna height will be approximately 10 miles at 80 feet, 17 miles at 200 feet, 35 miles at 1000 feet and 55 miles at 2000 feet.

Regardless of the type of receiving antenna used, most efficient reception will depend upon an antenna having the following requisites.

1. Maximum height above ground.

2. Resonance to the signal frequency.

   A half wave dipole antenna cut to the proper length for the reception of the desired signal has proved to be very efficient. A dipole antenna consists of two rods or wires each one-fourth of the wave length of the desired frequency in length. A more convenient way of determining the length of each half of the dipole in inches would be to divide 2770 by the frequency in megacycles. For reception at 200 mc the use of the formula will show that the length of each half of dipole will be 13.8 inches. The lead-in should be as short as possible.

   These rods or wires are arranged so that they will be in a straight line. They are separated at the center by an air gap of a few inches. (See Fig. 4C.

   At this time it might be well to mention that if one antenna is to serve the dual purpose of receiving signals on channels removed from one another by a few megacycles the antenna should be cut for the higher of the two channels or frequencies.

3. Balanced transmission line.

   A balanced transmission line can be connected to each quarter wave section, the other end of the transmission line connecting to terminals A_1 and A_2 respectively on the receiver. Twisted pair transmission line with a characteristic impedance of 72 ohms will effect an efficient transmission of received energy from the antenna to the receiver. When twisted pair line is used the better low loss type will be found desirable. A concentric type of transmission line with air or polystyrence dielectric will be preferred due to the lower losses which are characteristic of that type of line.

4. Directivity.

   A half wave antenna such as is recommended will be found to be directional broadside to the transmitter location. Positioning the antenna accordingly will give the maximum pickup properties of the antenna.

5. Polarization.

   The receiving antenna should be erected either in a horizontal or vertical plane depending upon the polarization of the transmitted signal. Only when the receiving antenna is properly polarized with respect to the transmitted signal will the greatest electrical field, or lines of force, pass through the antenna and induce the largest voltage in it.

C. ADJUSTMENT AND OPERATION.

C-1. Receiver Operation:- With all the connections made as described above, the receiver may be operated as follows:

(a) Plug in phones, or connect speaker to 500 or 5000 ohm terminals at rear.

(b) Place send-receive switch in receive position. This switch prevents the receiver from operating when in the "send" position but allows the tube heaters to remain on.

(c) Place the AM-FM switch in position to receive the type of modulation desired.

(d) Advance the RF gain control in a clockwise position as far as it will go.

(e) Operate the handwheel tuning knob until signal is heard or indicated on the tuning meter. For AM reception adjust for maximum S meter reading. For FM reception adjust the tuning to resonance as indicated by the zero center reading of the pointer on the red line. See Note

(f) Adjust the antenna control for maximum audibility of signal on AM reception or a minimum noise if no modulation is present or if an FM carrier is being received. See Note 2.

(g) Adjust AF gain control for the desired speaker volume.

(h) The AVC on-off switch should be in the "on" position for normal reception.

(i) In the presence of ignition interference the ANL switch may be placed in the "on" position, whence it will be found to appreciably increase the intelligibility of the received signal. Otherwise it should remain in the "off" position.

(j) The tone control may be adjusted to produce high frequency cut-off if so desired.

Notes (1) Tuning Meter - When used in the AM position the tuning meter indicates the strength of the carrier received. The AVC switch must be in the "on" position and the RF gain control turned to the extreme right or this meter will not operate. When tuning the receiver in the FM position the meter will deflect to one side when approaching a carrier, then swing back to center and to an equal deflection on the other side as the carrier is passed, then return to zero when tuned beyond the carrier. The zero center position of the pointer in the middle of the swing represents the correct setting for resonance.

(2) Antenna Trimmer - The antenna trimmer is necessary to compensate for misalignment produced in the first tuned circuit by antenna variations. For the same antenna its setting will be approximately constant for considerable range of frequencies. Adjust the antenna trimmer knob as indicated in paragraph C-1f.

D. ALIGNMENT AND SERVICE.

D-1. Receiver Alignment:- This receiver has been carefully aligned at the factory by qualified engineers and alignment should not be attempted unless it is known that the adjustments have been tampered with or that tubes of a different manufacture have been substituted. The equipment needed will be a signal generator capable of tuning from 210 to 130 mc., another or the same signal generator tuneable to 16 mc (intermediate frequency), a non-metallic screw driver, a 60 ohm non-inductive resistor for a dummy antenna and an output meter.

The controls should be set as follows:

RF Gain Control At Maximum
AF Gain Control At Maximum
AM-FM Switch In AM Position
AVC Switch In OFF Position
ANL Switch In Off Position

(a) I.F. Alignment:- Connect a signal generator to the grid of the 954 converter tube V_3 using either a small clip or a piece of flexible wire around the grid terminal. Do not attempt to solder to the tube as the heat is certain to crack the glass. Connect the output meter across the speaker terminals. Tune the signal generator to 16 megacycles and align transformers T_5, T_6, T_7 and T_8 for maximum response.

A bakelite screw-driver with a metal or insulated tip is necessary for accurate alignment. Disconnect filament lead (pin #7) from V_4 (6AC7) the 1st IF tube and allow the tube about a minute to cool off. With generator connected to the grid of the V_3, 954 converter tube, increase generator output until a signal is heard. Adjust neutralizing condenser C_{18} for minimum output and at the same time adjusting C_{22} on T_6 for maximum output to compensate for the detuning of plate circuit with changes in setting of C_{18}. Reconnect V_4 filament lead and disconnect V_5 (6AB7) 2nd IF filament lead (Pin #7). Adjust neutralizing condenser C_{26} for minimum output and C_{29} on T_7 for maximum output, same as for the 1st IF stage. Reconnect V_5 filament and allow tube to warm up. Then detune transformers T_6 and T_8 until a fairly large generator output is required to give an audible signal. Adjust T_5 and T_7 for maximum output. Adjust first T_8 and then T_6 for maximum output without retuning T_5 and T_7. Reduce the generator output as required while retuning.

To align the "discriminator" transformer T_9 turn the AM-FM switch to the FM position.

Leave the signal generator set at the frequency originally used for IF alignment with the modulation left on. Rotate the trimmer C_{42} across the discriminator T_9 secondary until the signal drops to zero. As this point is approached very suddenly, turn the control very slowly. Now slightly detune the signal generator until the output meter gives a readable indication. Adjust the primary trimmer control of the discriminator transformer for maximum response.

Next detune the signal generator to either side of resonance and note the maximum output in each case as indicated on the output meter. These values should be the same for good balance. If they are not, then tune the signal generator to the lower of the two peaks and adjust the primary trimmer C_{41} until the output rises an amount equal to about half the difference of the two outputs previously noted.

Retest for balance as above and readjust the primary trimmer till both maximum readings are alike when the signal generator is detuned to either side of resonance.

If a balance cannot be obtained, it is an indication that the discriminator secondary

trimmer control has been adjusted off its proper center and will require a very slight readjustment in either direction. The direction of adjustment that will cause the off-tune peaks to assume the same values is the correct one. Care must be taken in adjusting the discriminator secondary control as even a slight misadjustment will result in distorted reception of frequency-modulated signals.

(b) R.F. Alignment:- Connect a high frequency signal generator to the antenna terminal A_1 through a 60 ohm resistor. Connect the ground of the generator to the terminal marked A_2 of the receiver. The Measurements Corp. Model 75 standard signal generator is recommended. If this is not available, harmonics of a standard signal generator such as Ferris Instrument Corp. Model 18B may be used. The controls should be set in the same position as for IF alignment. To begin RF alignment, set the AM-FM switch in the AM position. Tune generator to 200 MC or a harmonic that will fall at 200 MC. Set receiver dial to 200 MC and adjust C_7 and C_{12} and also the antenna trimmer C_2 for maximum output while rocking the tuning condenser back and forth across the signal. Should it be necessary to adjust the frequency of the oscillator this may be done by loosening and shifting the oscillator transformer T_4, primary which is the two turn winding nearest the front panel. After adjustment this winding should be cemented in place with Amphenol "912" or any other low loss cement.

Tune generator and receiver to 130 MC and check for alignment. Should any of the circuits show misalignment at the low frequency end the secondary inductance of the transformers T_1, T_2, T_3 and T_4 may be adjusted by loosening the clamps and set screws which hold the coils in place as shown in Fig. 3 and sliding the transformers back and forth. Tighten all set screw after adjustment.

If it becomes necessary to adjust the low frequency end, the adjustment at the high frequency end must be repeated.

NOTE:

The frequency of the oscillator is lower than the signal frequency. Example: If the receiver dial is set at 200 MC and the generator output increased approximately 5000 times, and the generator adjusted to a frequency twice the IF frequency lower than 200 MC or 168 MC., another signal (image) should be heard.

D-2 Maintenance:- Routine maintenance should include keeping the units inside of the cabinet free from dust accumulation. If dust collects on the plates of the tuning condenser or the gear drive, it should be blown out with dry air.

The gear drive will require a minute amount of light machine oil at each of its bearings at least twice per year.

If the sensitivity of the receiver begins to fall off, the tubes should be individually tested. In replacing original tubes which have tested O.K., care should be exercised to plug them back into the same socket. Acorn tubes should be inserted into the socket with the short end of the body in the socket.

D-3. TABLE OF TUBE SOCKET VOLTAGES

117 Volt Line - Measured to ground with a 20,000 ohms per volt meter.
RF Gain at Maximum

TYPE	DESCRIPTION	ACORN TUBE ELEMENTS				
		HEATER	HEATER	PLATE	SCREEN	CATHODE
V_1 954	First RF Amplifier	0	6.2 AC	143	97	1.45
V_2 954	Second RF Amplifier	0	6.2 AC	143	97	1.45
V_3 954	First Dptector-Mixer	0	6.2 AC	156	93	4.6
V14 955	High Freq. Osc.	0	6.2 AC	108		0

Type	Description	SOCKET PIN NUMBERS							
		1	2	3	4	5	6	7	8
V_4 6AC7	First IF Amplifier	0	0						
V_5 6AB7	Second IF Amplifier	0	0	0					
V_6 6SK7	Third IF Amplifier	0	0	0	0	2.1	170	6.2AC	245
V_7 6H6	Second Det. and ANL	0	6.2AC	4.3	0	1.5	155	6.2AC	245
V_8 6AC7	F.M. Limiter	0	6.2AC	0	0	4.3	97	0	240
V_9 6H6	F.M. Discriminator	0	6.2AC	0	0	0	0	0	0
V10 6SC7	Audio Amplifier	0	6.2AC	0	0	0	38	0	38
V_{11} 6V6	Audio Output	0	62	0	0	0	0	0	0
V_{12} VR150	Voltage Regulator	0	0	270	250	62	.55	6.2AC	0
V_{13} 5X4G*	Rectifier	0	0	155	0	0	0	6.2AC	10
				280 AC	0	155	0	155	0
						280 AC	0	280	280

*5 Volts AC 7.8

E. ELECTRICAL AND MECHANICAL DATA

E-1. POWER REQUIREMENT - Model S-27C receiver draws 100 watts from a 117 volt 60 cycle A.C. power mains.

E-2. POWER OUTPUT - Two watts of audio power can be obtained with less than 5% distortion. Audio fidelity is within plus or minus 3 db. from 100 to 3,000 cycles. De-emphasis compensation is included for FM reception.

E-3. WEIGHTS - The weight of the chassis and cabinet together is 74 lbs. The weight of the chassis alone is 58 lbs.

E-4. DIMENSIONS - The overall dimensions of the receiver chassis installed in its table mounting cabinet are 19-1/8 inches wide, 9-3/8 inches high and 14-13/16 inches deep. Dimensions of the chassis alone are 19 inches wide, 8-23/32 inches high (these are the front panel dimensions) and 13-29/32 inches deep. This does not include the binding posts protruding from the rear side.

F. LIST OF REPLACEABLE PARTS - MODEL S-27C

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{1A} C_{1B} C_{1C}	Capacitor - R.F. Amplifier tuning	3 section variable air 28 mmfd. front and center section, 21 mmfd. rear section, effective capacity	H	Spec. 48-067	C_{1A}, C_{1B} and C_{1C} are on the same frame and are ganged to C_{1D}
C_{1D}	Capacitor - Osc. Tuning	1 section variable air 28 mmfd., effective capacity.	H	Spec. 48-066	C_{1D} ganged to C_{1A}, C_{1B}, and C_{1C}
C_2	Capacitor - Antenna Trimmer	4.5 mmfd. variable air	H	Part of C_1	
C_3	Capacitor - 1st R.F. Amplifier cathode by-pass	300 mmfd. ± 20% 600 v. dc. test	CD	Type 5 mica	
C_4	Capacitor - 1st R.F. Amplifier screen by-pass	Same as C_3			
C_5	Capacitor - 1st R.F. Amplifier plate supply by-pass	Same as C_3			
C_6	Capacitor - R.F. Coupling	5-6½ mmfd. 600 v. dc. test	CRL	Type 807004 NTC	
C_7	Capacitor - 2nd R.F. Amplifier Trimmer	2 mmfd. variable	H	Spec. 44-081	
C_8	Capacitor - 2nd R.F. Amplifier cathode by-pass	Same as C_3			
C_9	Capacitor - 2nd R.F. Amplifier screen by-pass	Same as C_3			
C_{10}	Capacitor - R.F. Coupling	Same as C_6			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{11}	Capacitor - 2nd R.F. Amplifier plate supply by-pass	Same as C_3			
C_{12}	Capacitor - Converter Trimmer	Same as C_7			
C_{13}	Capacitor - Converter screen by-pass	Same as C_3			
C_{14}	Capacitor - Converter plate supply by-pass	.01 mfd. ± 20% 600 v. dc test	CD	Type 1 mica	Located in T_5
C_{15}	Capacitor - 1st I.F. primary trimmer	34-67 mmfd. variable air	SI	Type 2144	Dual Unit
C_{16}	Capacitor - 1st I.F. secondary trimmer	34-67 mmfd. variable air			
C_{17}	Capacitor - 1st I.F. AVC by-pass	.004 ± 10% 600 v. dc. test	CD	Type 1 mica	
C_{18}	Capacitor - 1st I.F. neutralizing trimmer	2 to 6 mmfd. variable ceramic	CRL	Type 820-A	Hallicrafter Spec. 44-079
C_{19}	Capacitor - 1st I.F. cathode by-pass	.006 mfd. ± 10% 600 v. dc. test	CD	Type 1 mica	
C_{20}	Capacitor - 1st I.F. screen by-pass	.002 mfd. ± 20% 600 v. dc. test	CD	Type 1 mica	
C_{21}	Capacitor - 1st I.F. plate supply by-pass	Same as C_{14}			
C_{22}	Capacitor - 2nd I.F. primary trimmer	Same as C_{15} and C_{16}			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{23}	Capacitor - 2nd I.F. secondary trimmer	Same as C_{15} and C_{16}			
C_{24}	Capacitor - 2nd I.F. cathode by-pass	Same as C_{19}			
C_{25}	Capacitor - 2nd I.F. AVC by-pass	.003 mmfd. ± 10% 600 v. dc. test	CD	Type 1 mica	
C_{26}	Capacitor - 2nd I.F. neutralizing trimmer	Same as C_{18}			
C_{27}	Capacitor - 2nd I.F. screen by-pass	Same as C_{20}			
C_{28}	Capacitor - 2nd I.F. plate supply by-pass	Same as C_{14}			
C_{29}	Capacitor - 3rd I.F. primary trimmer	Same as C_{15} and C_{16}			
C_{30}	Capacitor - 3rd I.F. secondary trimmer	Same as C_{15} and C_{16}			
C_{31}	Capacitor - 3rd I.F. grid coupling	50 mmfd. ± 20% 600 v. dc. test	CD	Type 5 mica	
C_{32}	Capacitor - 3rd I.F. cathode by-pass	Same as C_{20}			
C_{33}	Capacitor - 3rd I.F. screen by-pass	Same as C_{20}			
C_{34}	Capacitor - 3rd I.F. plate supply by-pass	Same as C_{20}			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{35}	Capacitor - 4th I.F. primary trimmer	Same as C_{15} and C_{16}			
C_{36}	Capacitor - 4th I.F. secondary trimmer	Same as C_{15} and C_{16}			
C_{37}	Capacitor - Diode I.F. return	Same as C_3			
C_{38}	Capacitor - Diode filter	Same as C_{31}			
C_{39}	Capacitor - A.N.L. return	.05 mfd. ± 20% 400 v. dc. working	CD	Type DAR 4005	
C_{40}	Capacitor - Discriminator coupling	25 mmfd. ± 20% 600 v. dc. test	CD	Type 5 mica	Located in T_9
C_{41}	Capacitor - Discriminator primary trimmer	Same as C_{15} and C_{16}			
C_{42}	Capacitor - Discriminator secondary trimmer	Same as C_{15} and C_{16}			
C_{43}	Capacitor - Limiter plate supply by-pass	Same as C_{20}			Located in T_9
C_{44}	Capacitor - Limiter screen by-pass	Same as C_{20}			
C_{45}	Capacitor - AVC filter	500 mmfd. ± 10% 600 v. dc. test	CD	Type 1 mica	
C_{46}	Capacitor - FM detector by-pass	Same as C_{31}			
C_{47}	Capacitor - de-emphasis circuit	Same as C_{45}			
C_{48}	Capacitor - A.F. coupling	Same as C_{14}			

LIST OF REPLACEABLE PARTS - (Continued)

SYMBOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{49}	Capacitor - A.F. cathode by-pass	20 mfd. - 20% + 50% 100 v. dc. working	IC	Type 100BE20	
C_{50}	Capacitor - A.F. cathode by-pass	Same as C_{49}			
C_{51}	Capacitor - Tone control circuit	Same as C_{14}			
C_{52}	Capacitor - A.F. coupling	Same as C_{14}			
C_{53}	Capacitor - A.F. plate by-pass	.005 ± 20% 1000 v. dc. working	IC	Type 7641	Hallicrafters Spec. 46A007
C_{54}	Capacitor - Power supply filter	4 mfd. -3% + 10% 600 v. dc. working	CD	Type TL6040	
C_{55}	Capacitor - Power supply filter	Same as C_{54}			
C_{56}	Capacitor - Power supply filter	Same as C_{54}			
C_{57}	Capacitor - Power supply filter	Same as C_{54}			
C_{58}	Capacitor - Power supply filter	Same as C_{54}			
C_{59}	Capacitor - 1st R.F. filament by-pass	Same as C_3			
C_{60}	Capacitor - R.F. filament supply by-pass	Same as C_3			

LIST OF REPLACEABLE PARTS - (Continued)

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{61}	Capacitor - Osc. filament by-pass	Same as C_3			
C_{62}	Capacitor - 2nd R.F. filament by-pass	Same as C_3			
C_{63}	Capacitor - Converter filament by-pass	Same as C_3			
C_{64}	Capacitor - Power line filter	Same as C_{14}			
C_{65}	Capacitor - Power line filter	Same as C14			
C_{66}	Capacitor - Power line filter	Same as C_{14}			
C_{67}	Capacitor - Power line filter	Same as C_{14}			
C_{68}	Capacitor - Oscillator grid return	105 mmfd. ± 10% 600 v. dc. test	CRL	Type 813-0342	In parallel with C_{69} to reduce inductance
C_{69}	Capacitor - Oscillator grid return	Same as C_{68}			In parallel with C_{68} to reduce inductance.
C_{70}	Capacitor - Converter cathode return	Same as C_3			
C_{71}	Capacitor - Oscillator plate coupling	Same as C_{68}			
C_{72}	Capacitor - Oscillator plate by-pass	Same as C_3			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
C_{73}	Capacitor - Limiter grid coupling	Same as C_{40}			
C_{74}	Capacitor - A.V.C. by-pass	Same as C_{17}			
C_{75}	Capacitor - A.V.C. by-pass	Same as C_{14}			
R_1	Resistor - 1st R.F. Parasitic suppressor	2.2 ohms ± 10% 1/2 watt	ER	Type 504	
R_2	Resistor - 1st R.F. cathode bias	250 ohms ± 10% 1/2 watt	ER	Type 504	
R_3	Resistor - 1st R.F. screen supply	1000 ohms ± 20% 1/2 watt	ER	Type 504	
R_4	Resistor - 1st R.F. plate supply	Same as R_3			
R_5	Resistor - 2nd R.F. cathode bias	Same as R_2			
R_6	Resistor - 2nd R.F. screen supply	Same as R_3			
R_7	Resistor - 2nd R.F. plate supply	Same as R_3			
R_8	Resistor - Plate supply	12,000 ohms ± 10% 2 watt	IRC	Type BT2	
R_9	Resistor - Converter screen supply	Same as R_3			
R_{10}	Resistor - Converter plate supply	Same as R_3			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
R_{11}	Resistor - 1st I.F. parasitic suppressor	35 ohms ± 20% 1/2 watt	ER	Type 504	
R_{12}	Resistor - 1st I.F. A.V.C. filter	100,000 ohms ± 20% 1/2 watt	ER	Type 504	Located in T_5
R_{13}	Resistor - 1st I.F. A.V.C. filter	Same as R_{12}			
R_{14}	Resistor - 1st I.F. cathode bias	150 ohms ± 20% 1/2 watt	ER	Type 504	
R_{15}	Resistor - R.F. gain control circuit	100,000 ohm ± 20% 1 watt	ER	Type 518	
R_{16}	Variable Resistor - R.F. gain control	10,000 ohm ± 20% curve 8 reversed	CT	Type 31	Hallicrafters Spec.25-058
R_{17}	Resistor - 1st I.F. screen supply	40,000 ohms ± 10% 1/2 watt	ER	Type 504	
R_{18}	Resistor - 1st I.F. plate supply	300 ohms ± 10% 1/2 watt	ER	Type 504	
R_{19}	Resistor - 2nd I.F. A.V.C. filter	Same as R_{12}			Located in T_6
R_{20}	Resistor - 2nd I.F. A.V.C. filter	Same as R_{12}			
R_{21}	Resistor - 2nd I.F. parasitic suppressor	Same as R_{11}			
R_{22}	Resistor - 2nd I.F. cathode bias	Same as R_{14}			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
R_{23}	Resistor - 2nd I.F. screen supply	Same as R_3			
R_{24}	Resistor - 2nd I.F. plate supply	Same as R_{18}			
R_{25}	Resistor - Meter shunt AM operation	Same as R_{11}			
R_{26}	Resistor - 3rd I.F. grid leak	500,000 ohms ± 20% 1/2 watt	ER	Type 504	
R_{27}	Resistor - 3rd I.F. cathode bias	600 ohms ± 10% 1/2 watt	ER	Type 504	
R_{28}	Resistor - Voltage divider	7,500 ohms ± 10%, 10 watt	O	Type BD	
R_{29}	Resistor - 3rd I.F. screen supply	Same as R_3			
R_{30}	Resistor - 3rd I.F. Plate supply	Same as R_3			
R_{31}	Resistor - Diode Filter	50,000 ohms ± 20% 1/2 watt	ER	Type 504	
R_{32}	Resistor - ANL Resistor	1 megohm ± 20% 1/2 watt	ER	Type 504	
R_{33}	Resistor - Diode Load	Same as R_{12}			
R_{34}	Resistor - Diode Load	250,000 ohms ± 20% 1/2 watt	ER	Type 504	
R_{35}	Resistor - Diode Load	Same as R_{34}			
R_{36}	Resistor - AVC Isolation	Same as R_{26}			

LIST OF REPLACEABLE PARTS - (Continued)

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
R_{37}	Resistor - AVC Isolation	Same as R_{12}			
R_{38}	Resistor - Limiter Grid Leak	Same as R_{31}			
R_{39}	Resistor - Limiter Parasitic Suppressor	Same as R_{11}			
R_{40}	Resistor - Limiter Screen Supply	3900 ohms ± 10%, 2 watt	IRC	Type BT2	
R_{41}	Resistor - Limiter Grid Leak	Same as R_{34}			
R_{42}	Resistor - Voltage Divider	3300 ohms ± 10%, 1 watt	IRC	Type BT1	
R_{43}	Resistor - Meter Current Reducer	330,000 ohms ± 10%, 1/2 watt	IRC	Type BT-1/2	
R_{44}	Resistor - Limiter Plate Supply	Same as R_5			Located in T_9
R_{45}	Resistor - FM Diode Load	Same as R_{12}			
R_{46}	Resistor - FM Diode Load	Same as R_{12}			
R_{47}	Resistor - de-emphasis	200,000 ohms ± 20%, 1/2 watt	ER	Type 504	
R_{48}	Variable Resistor - AF gain Control	1 megohm ± 20%, curve 6	CRL	Type 1-010	Hallicrafters Spec. 25-059
R_{49}	Resistor - AF Cathode Bias	3,000 ohms ± 20%, 1/2 watt	ER	Type 504	
R_{50}	Resistor - AF Plate Load	Same as R_{34}			
R_{51}	Resistor - AF Grid Leak	Same as R_{26}			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
R_{52}	Variable Resistor - Tone control	500,000 ohms ± 20% Curve 6	CT	Type 31	Hallicrafters Spec. 25-065
R_{53}	Resistor - AF Cathode Bias	220 ohms ± 10%, 1 watt	IRC	Type BW1	
R_{54}	Resistor - Output Load Phone Operation	4700 ohms ± 20%, 2 watt	IRC	Type BT2	
R_{55}	Adjustable Resistor - "S" Meter	1500 ohms ± 20%	CT	Wire Wound	Hallicrafters Spec. 25-060G
R_{56}	Resistor - Voltage Regulator Supply	3200 ohms ± 10%, 10 watt	O	Type BD	
R_{57}	Resistor - Oscillator Grid Leak	20,000 ohms ± 10%, 1/2 watt	ER	Type 504	
R_{58}	Resistor - Converter Cathode Bias	4000 ohms ± 10%, 1/2 watt	ER	Type 504	
R_{59}	Resistor - Oscillator Plate Supply	5000 ohms ± 10%, 1/2 watt	ER	Type 504	
R_{60}	Resistor - Oscillator Plate Supply	Same as R_{18}			
R_{61}	Resistor - Converter Screen Supply	150,000 ohms ± 20%, 1/2 Watt	IRC	Type BT-1/2	
L_1	Inductor - Oscillator Plate		H	Spec. 53-008	
L_2	Inductor - Line Filter		H	Spec. 53-007	
L_3	Inductor - Line Filter	Same as L_2			

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
L_4	Inductor - Supply Filter	2 Henries 150 M.A.	H	Spec. 56-011	
L_5	Inductor - Supply Filter	10 Henries 80 M.A.	H	Spec. 56-012	
L_6	Inductor - Oscillator Filament		H	Spec. 53-009	
S_1	Switch - Power	250 V. 1 amp. SPST Toggle	HH	Type 20994-AC 3/8" Bushing	
S_2	Switch - Stand-by	Same as S_1			
S_3	Switch - S-Meter	A part of R_{16}			
S_4	Switch - AM-FM	Single Section Rotary	OM	Hallicrafters Spec. 60-045	
S_5	Switch - A.V.C. on-off	Same as S_1			
S_6	Switch - Noise Limiter	250 v. 1 amp. DPST Toggle	HH	Type 20902-AM 3/8" Bushing	
T_1	Transformer - Antenna	130 to 210 mc.	H	Spec. 51-350	
T_2	Transformer - 1st RF	130 to 210 mc.	H	Spec. 51-351	
T_3	Transformer - 2nd RF	130 to 210 Mc.	H	Spec. 51-352	
T_4	Transformer - Osc.	130 to 210 mc.	H	Spec. 51-353	
T_5	Transformer - 1st I.F.	16 mc. coupling	H	Spec. 50-100	
T_6	Transformer - 2nd I.F.	16 mc. coupling	H	Spec. 50-101	
T_7	Transformer - 3rd I.F.	16 mc. coupling	H	Spec. 50-102	

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
T_8	Transformer - diode I.F.	16 mc. coupling	H	Spec. 50-103	
T_9	Transformer - Discriminator	16 mc. coupling	H	Spec. 50-104	
T_{10}	Transformer - Audio Output	Pri. 5000 ohms, Sec. 5000 ohms, Tapped at 500 ohms	H	Spec. 55-012	
T_{11}	Transformer - Filament Power	Pri. 230 volts 50-60 cycles With Tap at 115 volts Sec. 5 v. at 3 amp. 6.3 v. at 4 amp.	H	Spec. 52-044	
T_{12}	Transformer - Plate Power	Pri. 230 volts 50-60 cycles With Tap at 115 volts Sec. 560 v. C.T. AC at 150 M.A.	H	Spec. 52-043	
M_1	Meter - AM-FM Tuning	160-0-40 Microamperes	H	Spec. 82A036	
I_1	Dial Lamp - Vernier Scale	6.3 Volt 250 M.A.	GE	#44 Bayonet Base	
I_2	Dial Lamp - Tuning Meter	6.3 Volt 150 M.A.	GE	#47 Bayonet Base	
V_1	Tube - First RF Amplifier	Acorn Pentode	RCA	Type 954	
V_2	Tube - Second RF Amplifier	Acorn Pentode	RCA	Type 954	
V_3	Tube - First Detector	Acorn Pentode	RCA	Type 954	
V_4	Tube - First IF Amplifier	R.F. Pentode	RCA	Type 6AC7	
V_5	Tube - Second IF Amplifier	R.F. Pentode	RCA	Type 6AB7	

LIST OF REPLACEABLE PARTS - (Continued)

SYM-BOL	NAME OR FUNCTION	DESCRIPTION	MFGR.	IDENTIFICATION	NOTES
V_6	Tube - Third IF Amplifier	R.F. Pentode	RCA	Type 6SK7	
V_7	Tube - Second Det. and A.N.L.	Double Diode	RCA	Type 6H6	
V_8	Tube - F.M. Limiter	R.F. Pentode	RCA	Type 6AC7	
V_9	Tube - F.M. Detector	Double Diode	RCA	Type 6H6	
V_{10}	Tube - Audio Amplifier	Double Triode	RCA	Type 6SC7	
V_{11}	Tube - Audio Output	Beam Power Amplifier	RCA	Type 6V6	
V_{12}	Tube - Voltage Regulator	Gas Filled Diode	RCA	Type VR150	
V_{13}	Tube - Plate Power Rectifier	Full Wave Diode	RCA	Type 5X4G	
J_1	Jack - Headphone	Std. Tip and Sleeve	U	Type ST 627, 1/2" Shank	
P_1	Plug - For AC Operation	Bakelite Octal	AP	Hallicrafters Spec. 81-007	
P_2	Plug - AC Line	Well Type	AP	Type 61-MI0	
X_1	Socket - DC Power	Bakelite Octal	AP	Type MIP8	
X_2	Socket - Standby	Two Circuit	AL	Type 4002T Socket	
W_1	Cable - Power Line Cord	2 Circuit	H	Spec. 87A081	
F_1	Fuse - Power Line	3 amp. 250 Volt	LF	Type 3AG	
F_2	Fuse - Power Line	Same as F_1			

G. INDEX TO PARTS MANUFACTURERS

SYMBOL	MANUFACTURER	ADDRESS
AL	Alden Manufacturing Company	Brockton, Massachusetts
AP	American Phenolic Corporation	Chicago, Illinois
CD	Cornell-Dubilier Corporation	South Plainfield, New Jersey
CRL	Centralab	Milwaukee, Wisconsin
CT	Chicago Telephone Supply	Elkhart, Indiana
ER	Erie Resistor Company	Erie, Pennsylvania
GE	General Electric Company	Chicago, Illinois
H	Hallicrafters Company	Chicago, Illinois
HH	Hart & Hegeman	Hartford, Connecticut
IC	Industrial Condenser Corporation	Chicago, Illinois
IRC	International Resistance Company	Philadelphia, Pennsylvania
LF	Littlefuse Inc.	Chicago, Illinois
O	Ohmite Manufacturing Company	Chicago, Illinois
OM	Oak Manufacturing Company	Chicago, Illinois
RCA	RCA Manufacturing Company	Chicago, Illinois
SI	F. W. Sickles Company	Springfield, Massachusetts
U	Utah Products Company	Chicago, Illinois

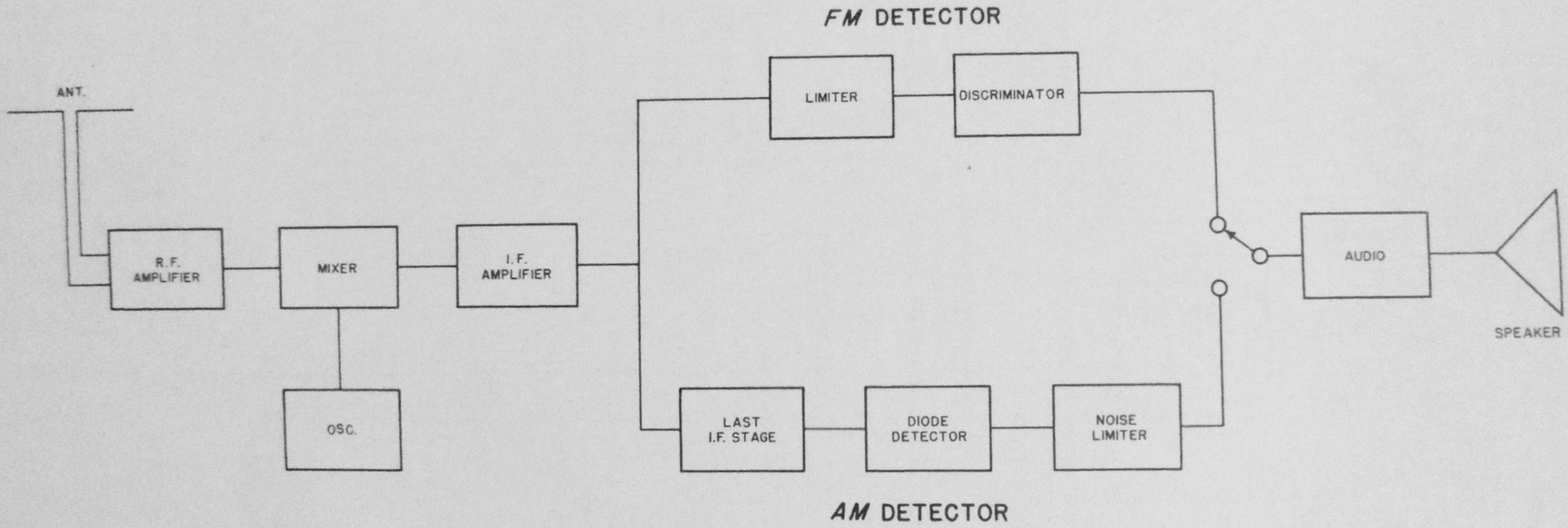

Fig. 1 - Model S-27C Receiver - Block Diagram

SCHEMATIC DIAGRAM - ULTRA HIGH FREQUENCY FM-AM RECEIVER - MODEL S-27C

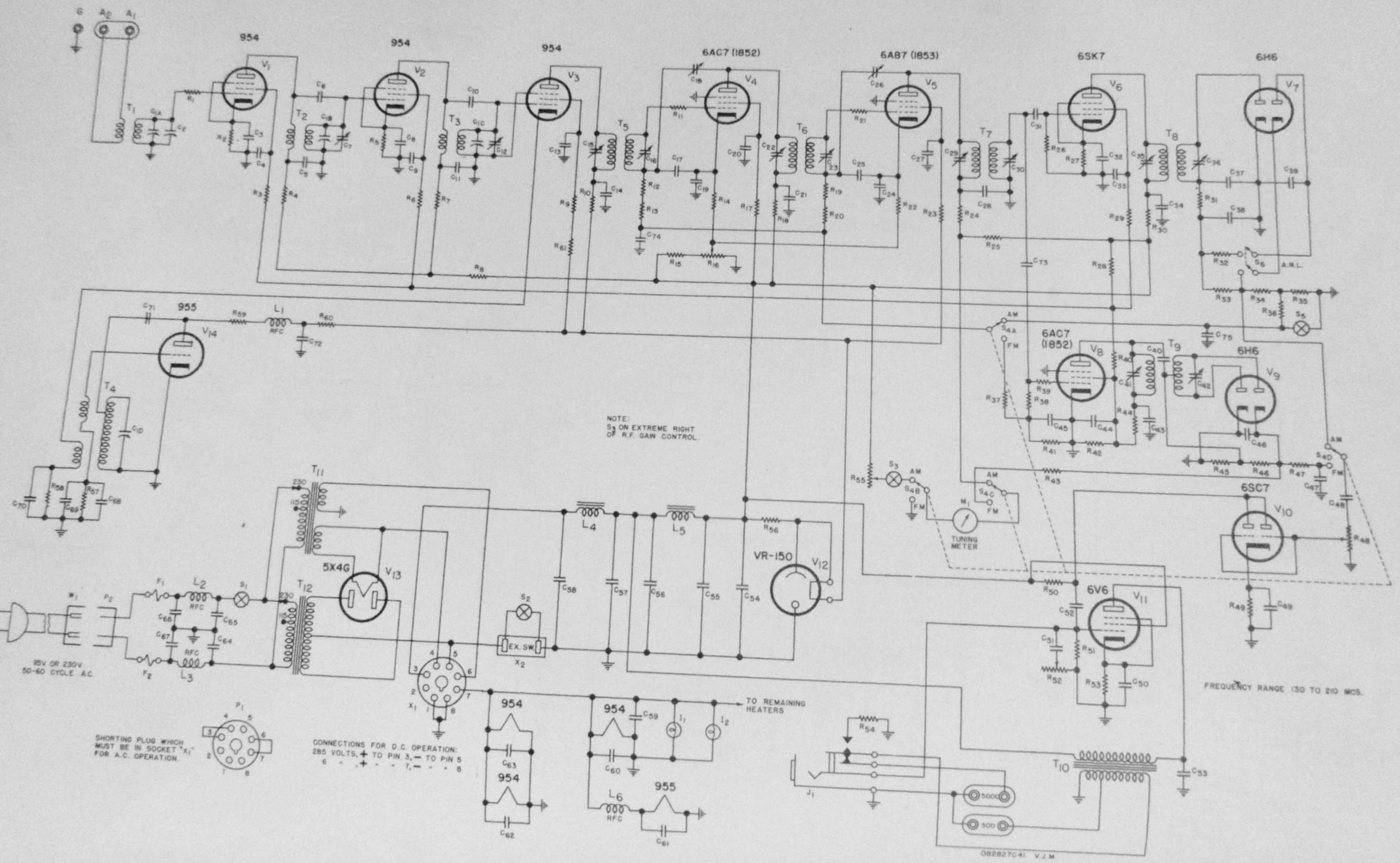

Fig. 2 — Model S-27C Receiver — Schematic

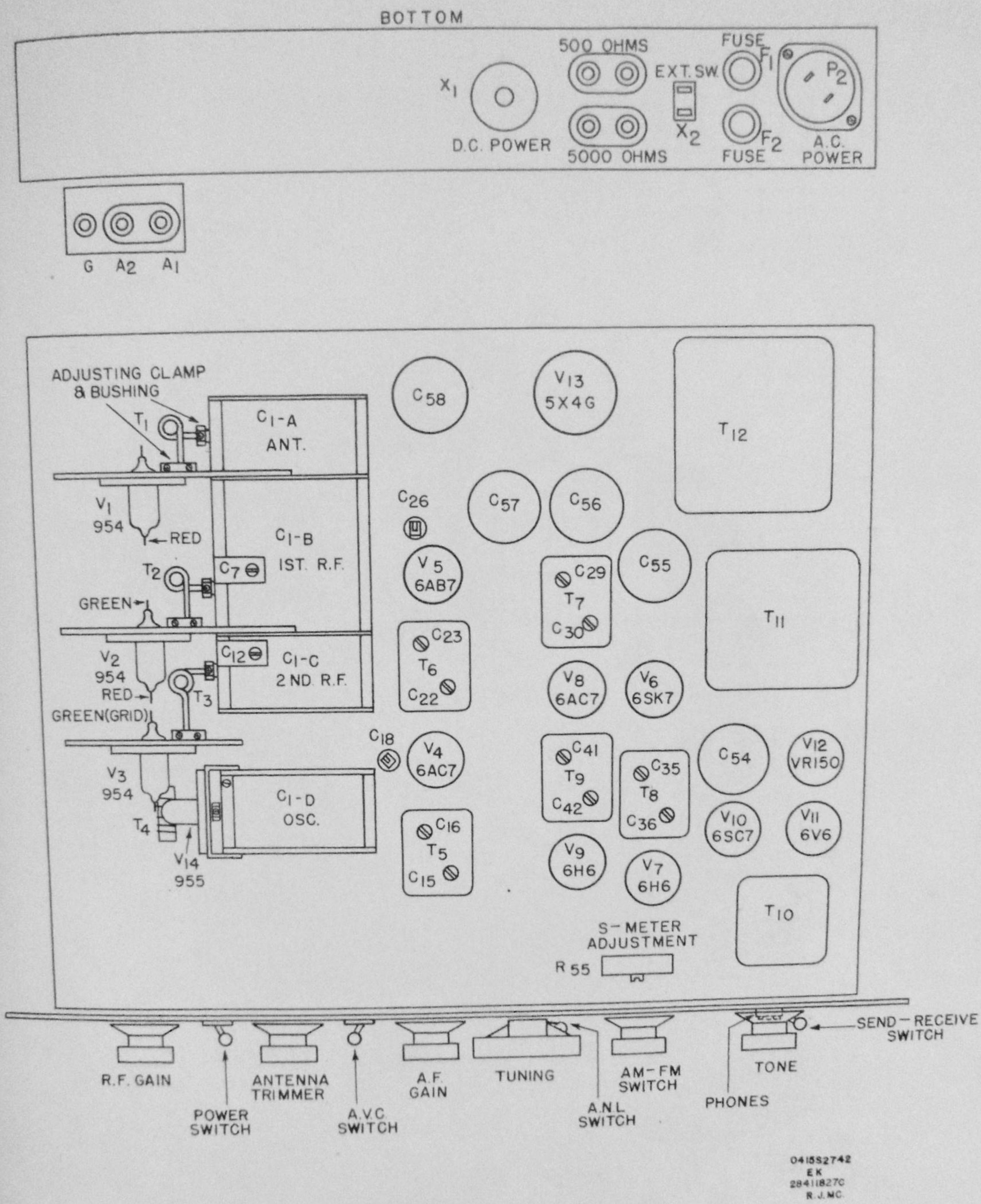

Fig. 3 - Model S-27C Receiver - Top and Rear Views
Showing Location of Important Parts

the hallicrafters *co.*

ANTENNA ASSEMBLY-MODEL S-27C

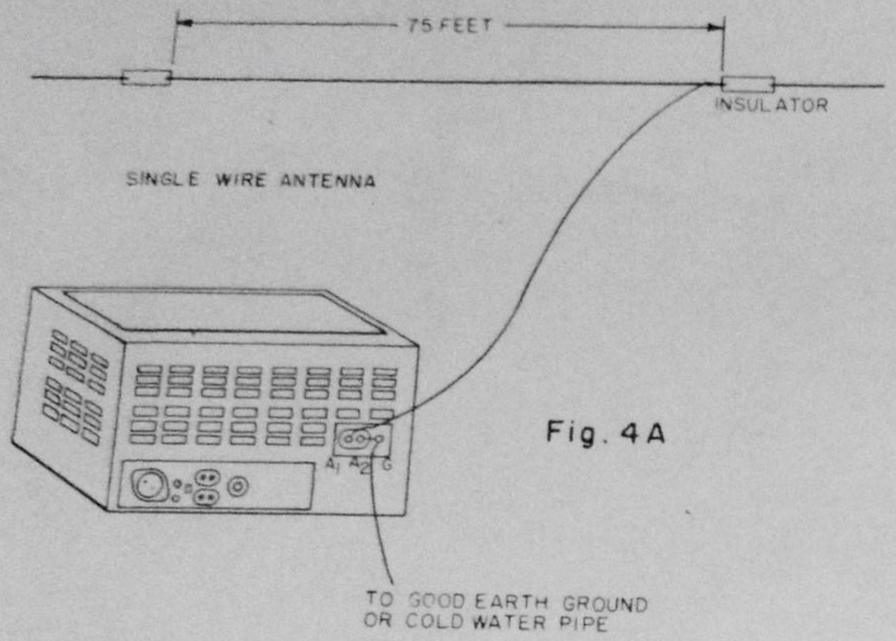

Fig. 4A

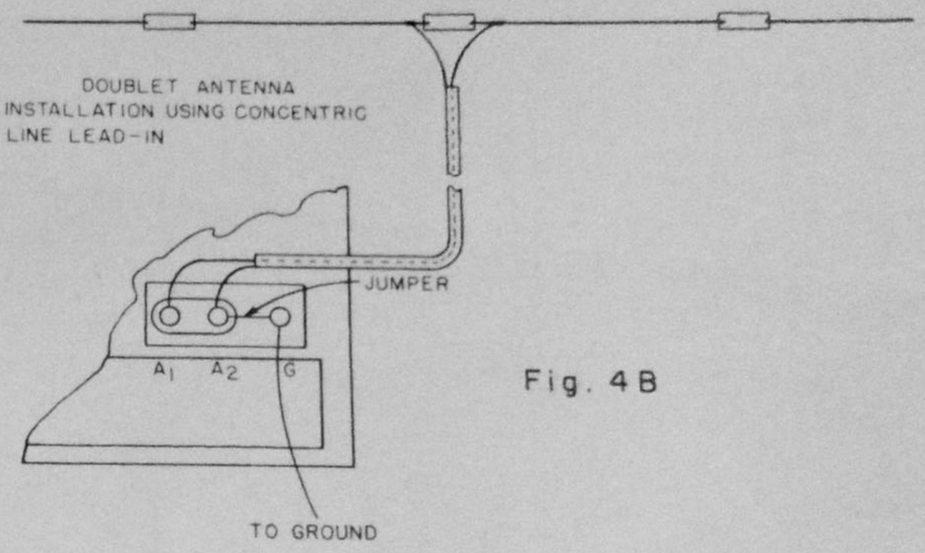

Fig. 4B

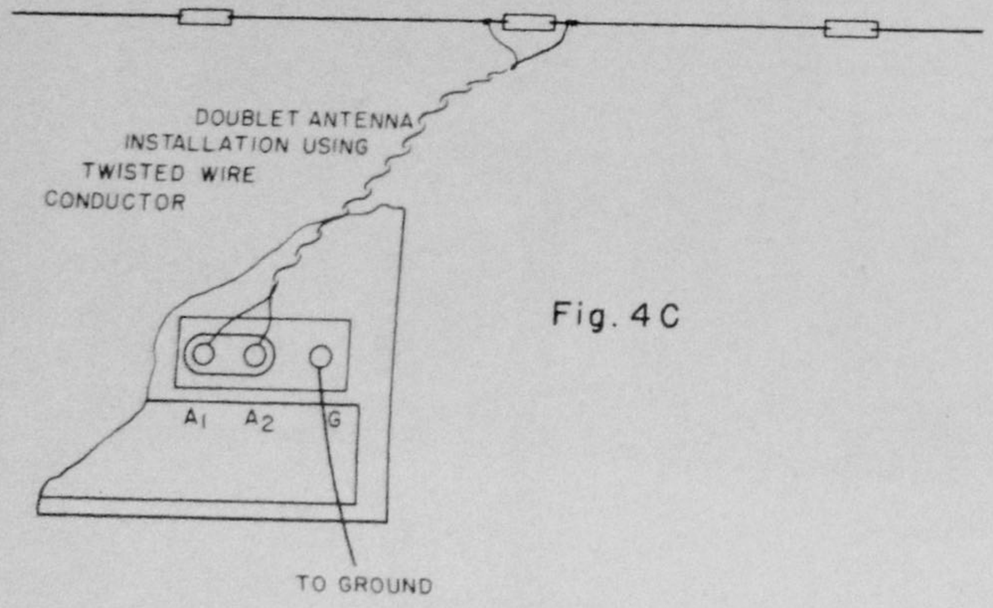

Fig. 4C

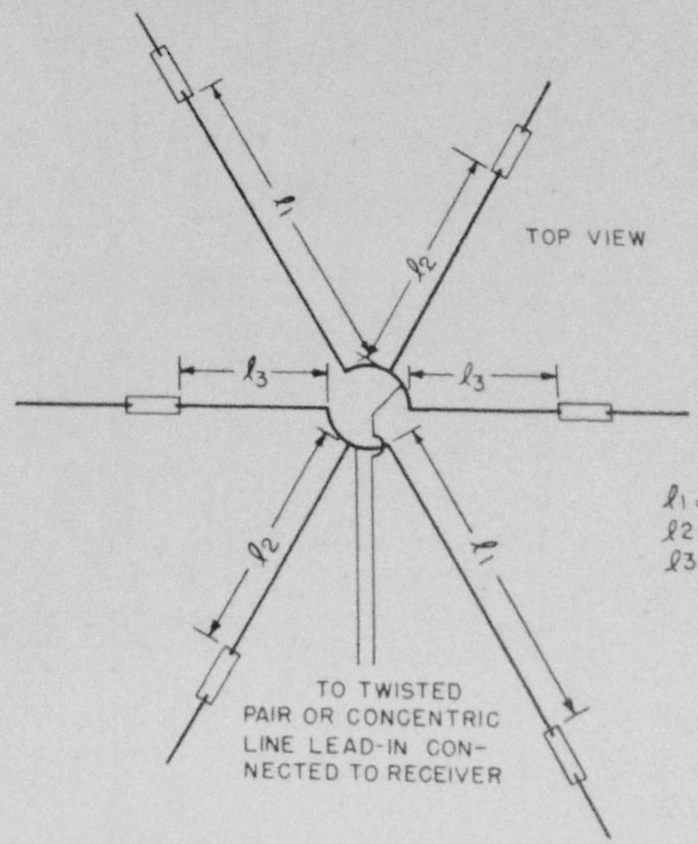

Fig. 4D

l_1 = APPROX. 19.8 INCHES
l_2 = APPROX. 16.3 INCHES
l_3 = APPROX. 13.8 INCHES

MULTIPLE DIPOLE ANTENNA

Fig. 4 - Model S-27C - Antenna Installation

0421S27C42 E.K.
PART NO. 92C011
ISSUE-A

Fig. 5 - Model S-27C Receiver - Front View

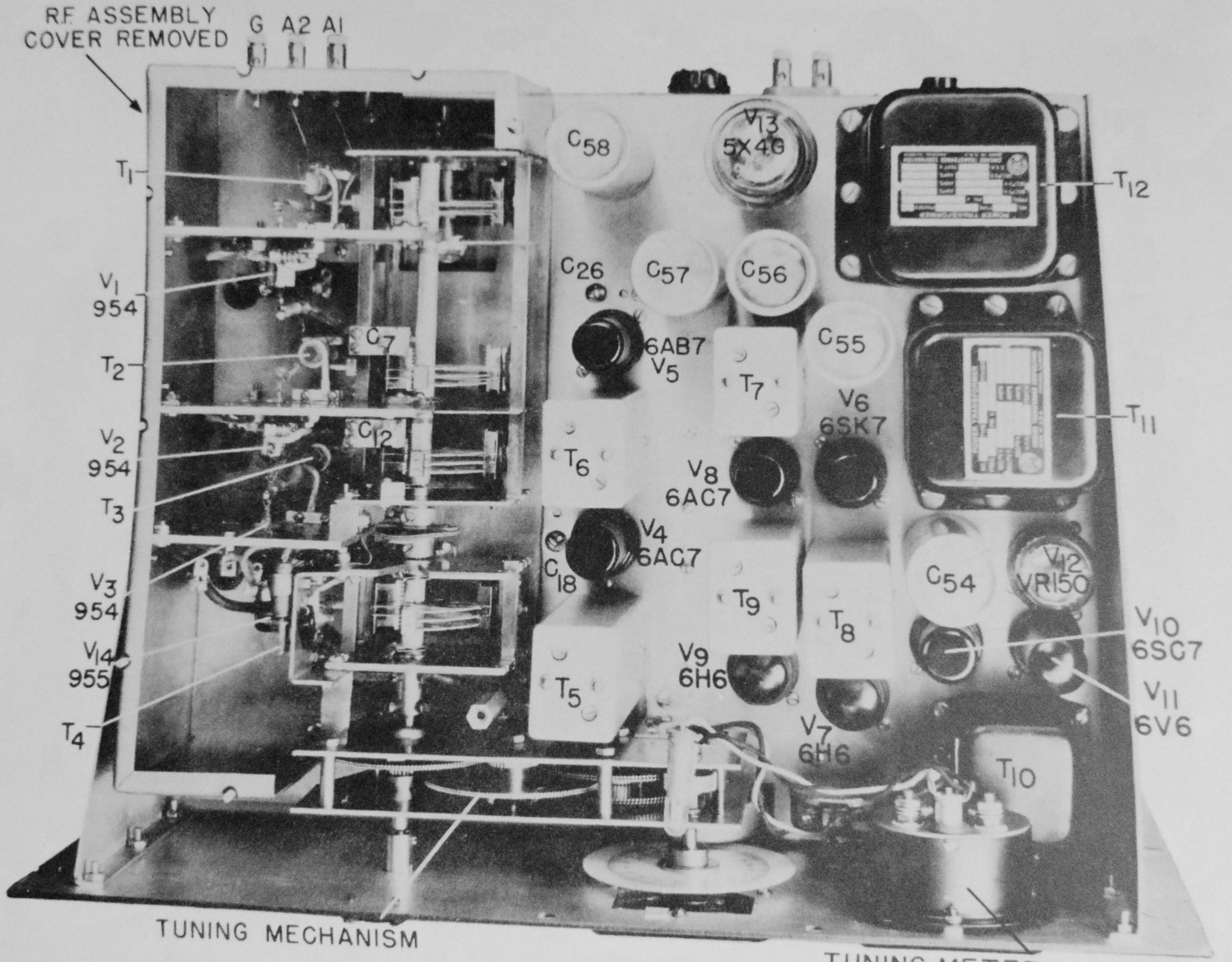

Fig. 6 - Model S-27C Receiver - Top View

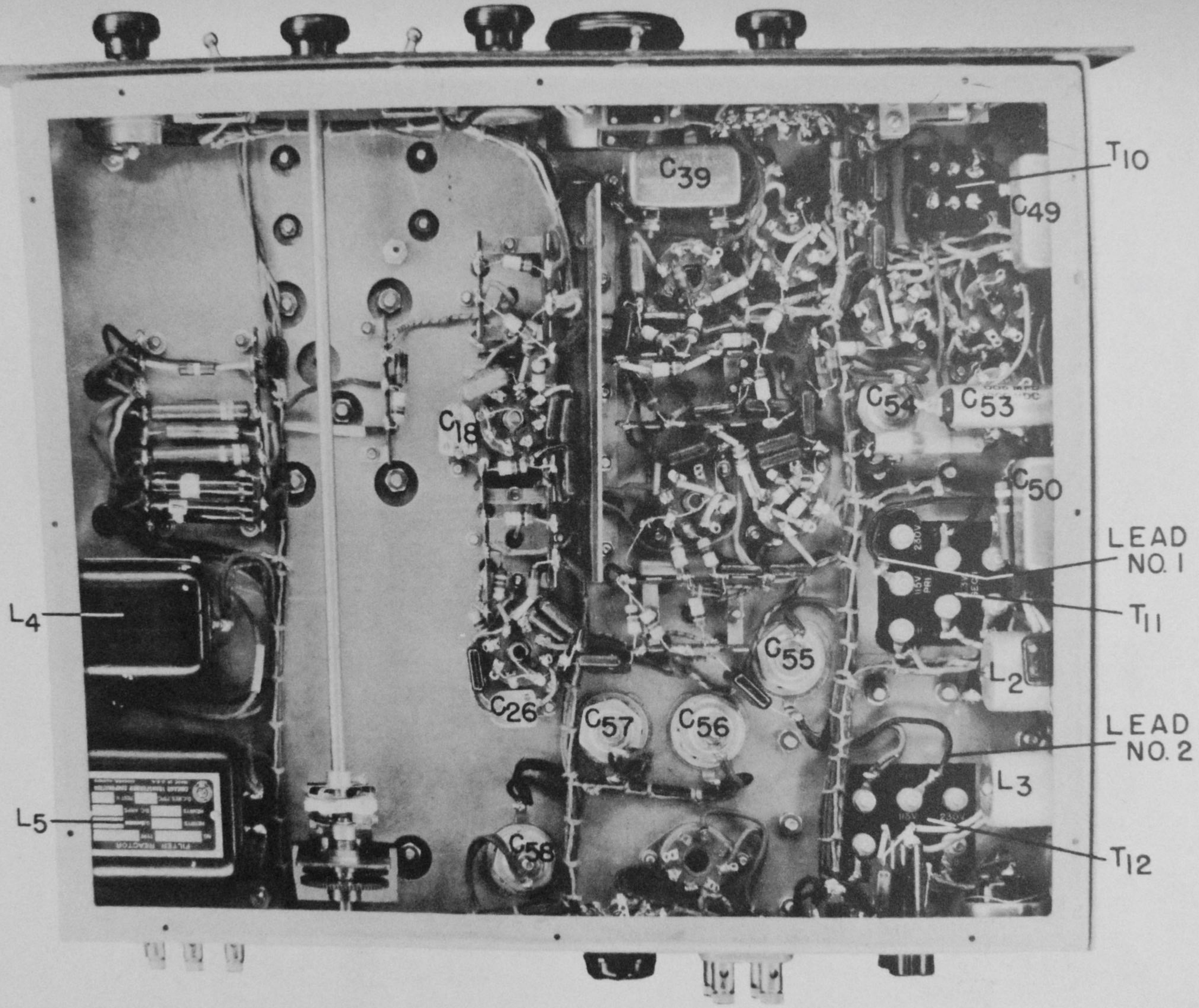

Fig. 7 - Model S-27C Receiver - Bottom View

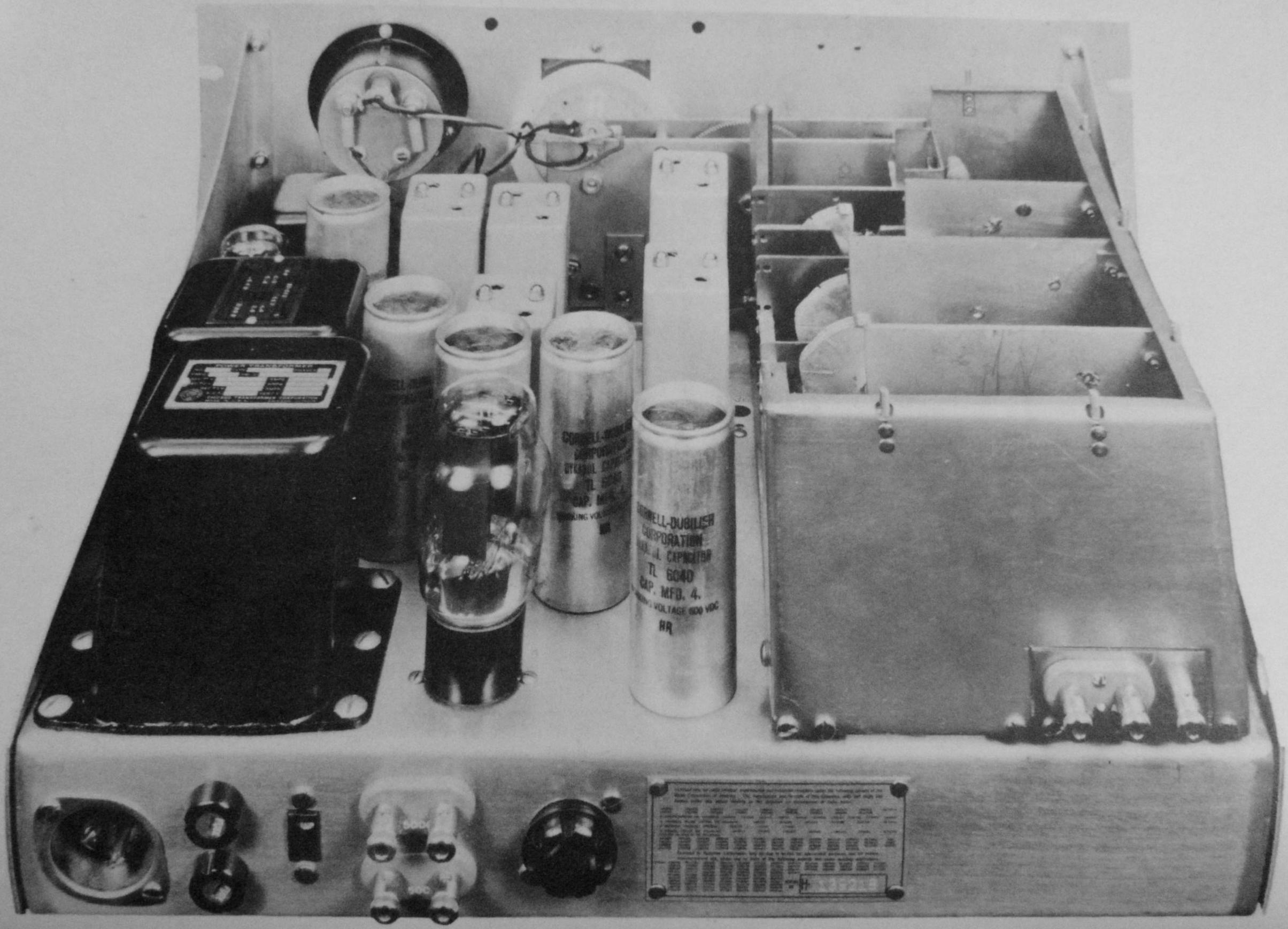

Fig. 8 - Model S-27C Receiver - Rear View

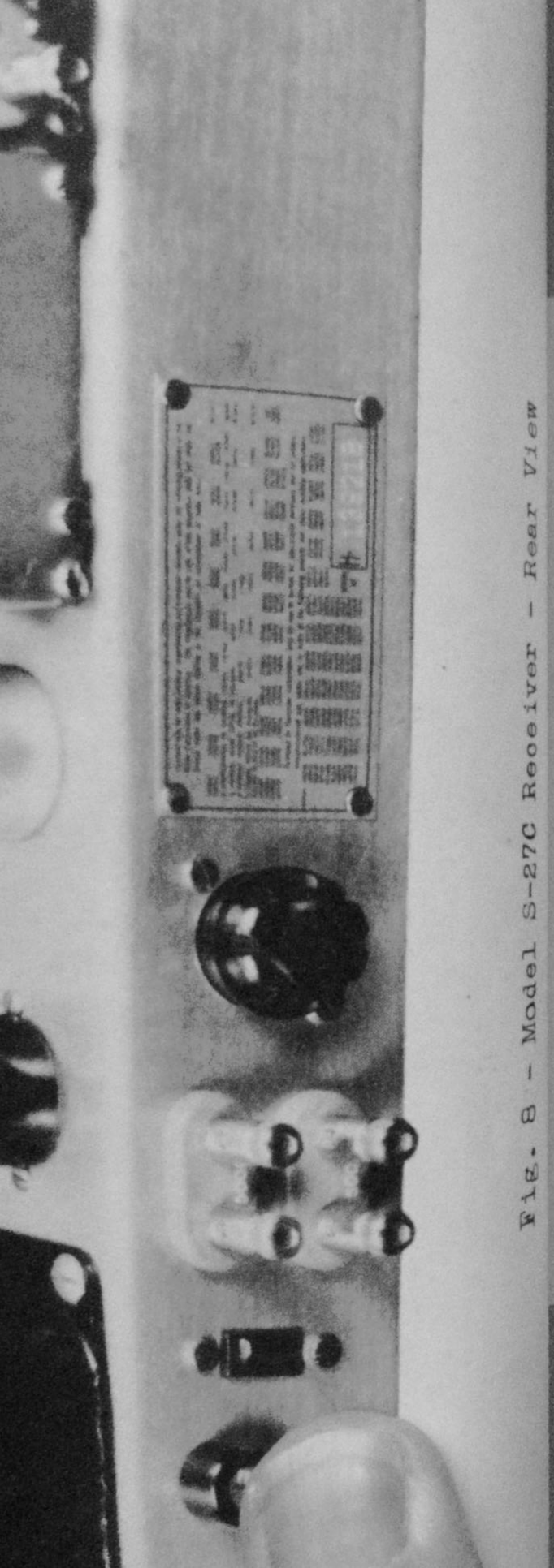

Fig. 8 - Model S-27C Receiver - Rear View

ERRATA

Add to List of Replaceable Parts.

1- Resistor, parasitic suppressor, 8 ohm ± 20%, ½ watt ER type 504

1- Capacitor, oscillator plate supply by-pass, .005 mfd ± 20% 600V. dc. test, mica Aerovox type 1467.

1- Tube, high frequency oscillator, RCA type 955 acorn, V14 in schematic (Fig.2).

This resistor and capacitor is not shown in schematic diagram. The resistor connects directly in series with oscillator tube (V14) grid. The capacitor is connected to the chassis from the center terminal of the three terminal strip located on the bottom side of the chassis directly to the right of the antenna trimmer shaft.