

NOTE: ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED.

Figure 7-7. Radio Receiver Model S-57, schematic wiring diagram.

Symbol	Tube Type	Function
V-1	954	1st r-f amplifier
V-2	904	2nd r-f amplifier
V-3	904	Mixer
V-4	6AC7	1st i-f amplifier
V-5	6AB7	2nd i-f amplifier
V-6	6SK7	3rd i-f amplifier
V-7	6H6	A-M detector and noise limiter
V-8	6AC7	F-M limiter
V-9	6H6	F-M discriminator
V-10	6X4GT	Audio voltage amplifier
V-11	6Y5GT/6	Voltage rectifier
V-12	6X4	High-frequency oscillator
V-13	6Y5	Rectifier
V-14	6Y5	High-frequency oscillator

A-C Operation	D-C Operation
Line voltage.....117 volts, 230 volts.	Filament voltage..... 6.3 volts.
Line current.....1.0 amp, 0.5 amp.	Filament current..... 2.6 amps.
Power Consumption.....110 watts.	B+ voltage..... 270 volts.
	B+ current..... 125 ma.

\* The 6-volt battery drain using a vibrator type supply for 8 $\frac{1}{2}$  voltage will run approximately 18-20 ampere-hours.

920105A

THE HALLICRAFTERS CO.

MODEL S-37

1. GENERAL

Figure 4-1. shows, in very simple block form, the plan of the circuit of the Model S-37 receiver. Note that the circuit is that of the conventional superheterodyne receiver up to the second-i-f amplifier stage. The output of the 2nd i-f amplifier is fed to two channels, namely, the F-M signal channel and the A-M signal channel. The F-M channel consists of the f-m limiter and discriminator and the A-M channel consists of an additional i-f amplifier stage and second detector stage. The demodulated signal from both channels then feeds the same audio amplifier being selected by the AM/FM switch.

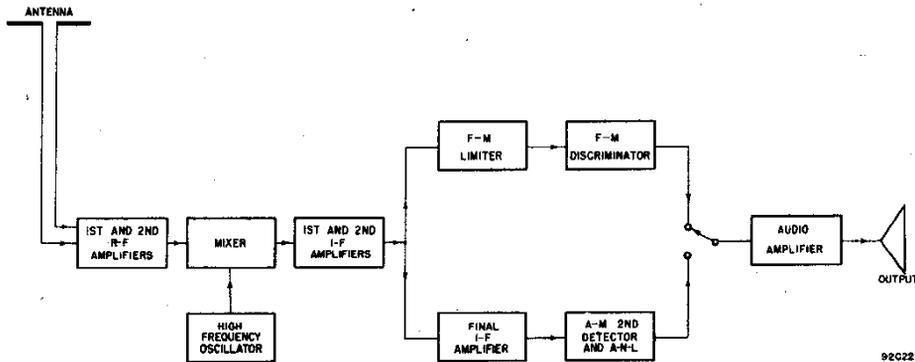


Fig. 4-1. Radio Receiver Model S-37, block diagram

2. DETAILED FUNCTIONING BY STAGES. (Refer to Fig. 7-7.)

a. R-F Amplifier. - The two r-f amplifier stages employ type 954 acorn pentode tubes in a conventional two stage amplifier circuit. Signals present at the antenna are fed to the primary of transformer T-1 through terminals A<sub>1</sub> and A<sub>2</sub> of antenna terminal strip TS-1. The secondary is tuned by the ganged tuning capacitor section C-1A and trimmer C-2. Trimmer capacitor C-2 is controlled from the front panel by the control marked ANTENNA to provide accurate alignment of the r-f stage with varying antenna load impedances. R-F signals selected by the parallel resonant circuit are applied to the grid of tube V-1 and appear in greater amplitude across the primary of transformer T-2. Parasitic resistor R-1 prevents unwanted oscillations in this stage and tends to stabilize the amplifier. Resistor R-2 by-passed by capacitor C-3, provides self-bias for the stage. Resistors R-3 and R-4 and capacitors C-4 and C-5 act as decoupling networks for the screen and plate circuit of tube V-1. The signal across the primary of transformer T-2 is coupled to the grid of tube V-2 inductively by transformer T-2 and capacitively by capacitor C-6. Capacitor C-6 provides a small amount of coupling to improve response at the high-frequency end of the band, thus equalizing the r-f signal amplitude over the tunable frequency range. The secondary of transformer T-2 is tuned by section C-1B of the ganged tuning capacitor and trimmer C-7. R-F signals applied to the grid of tube V-2 by the secondary winding of transformer T-2, appear at the primary of transformer T-3 in greater amplitude as a result of the amplifying action of tube V-2. Resistor R-5 by-passed by capacitor C-8 provides self-bias for the stage. Resistors R-6 and R-7 and capacitors C-9 and C-11 act as decoupling networks for the screen and plate circuit of tube V-2. The signal developed at the primary winding of transformer T-3 then feeds the mixer stage of the receiver.

b. Mixer. - The mixer stage employs a type 954 acorn pentode in a cathode coupled mixer circuit. The signal across the primary of transformer T-3 is coupled to the grid of tube V-3 inductively by transformer T-3 and capacitively by capacitor C-10. Capacitor C-10 provides a small amount of coupling to improve response at the high-frequency end of the band, thus equalizing the r-f signal amplitude over the tunable frequency range. The secondary of transformer T-3 is tuned by section T-10 of the ganged tuning capacitor and trimmer C-12. R-F signals selected by the parallel resonant circuit are applied to the grid of the mixer tube V-3. A signal from the local oscillator 16 megacycles lower in frequency than the receiver tuning frequency, is fed to the mixer tube through the cathode and provides the difference frequency of 16 mc. for the i-f stages.

c. Oscillator. - The oscillator circuit consists of a type 955 acorn triode in a tuned-plate untuned-grid type of oscillator circuit. The frequency of oscillation is determined by a resonant circuit which consists of the secondary of transformer T-4 and section C-1D of the main tuning gang connected in parallel. The r-f energy is

fed from the plate of tube V-14 to the tuned circuit by the d-c blocking capacitor C-71. The decoupling network in the plate circuit of the oscillator tube consists of R-59, L-1, C-72, and R-60. Resistor R-62 and R-57 by-passed by capacitor C-68 are connected in series with the feedback winding of transformer T-4 to provide equal oscillator voltage to the mixer stage over the entire tuning range. The mixer voltage is further compensated by the network R-58 and C-70, connected in series with the winding feeding the cathode of the mixer tube.

**d. First and 2nd I-F Amplifier.** - The 1st and 2nd i-f amplifier stages employ type 6AC7 and 6AB7 pentodes respectively. The i-f amplifier coupling transformers T-5, T-6 and T-7 for these two stages are tuned to 16 mc. by adjusting the powdered iron core slugs in both primary and secondary windings. Each stage is neutralized by capacitors C-18 for tube V-4 and C-26 for tube V-5, to provide stable amplification at this relatively high intermediate frequency. The gain of the 1st and 2nd i-f amplifier stages is varied by the R.F. GAIN control (R-16), connected in series with the cathodes of both tubes, to provide sensitivity control for the receiver instead of the usual practice of varying the gain of the r-f amplifier stages. This method of control permits the r-f amplifier stages to operate at maximum gain, thereby providing a high signal to noise ratio at all sensitivity settings. The a-v-c grid voltage is applied to this section of the receiver through the decoupling networks C-17, R-12, R-13, C-74, and R-19, R-20 and C-25. The a-v-c voltage is supplied by the 2nd detector during a-m reception and a small amount of voltage is also supplied, for a similar purpose, from the limiter tube (V-8) during f-m reception.

**e. Final I-F Amplifier.** - The last i-f amplifier, used for a-m reception, employs a type 6SK7 pentode connected in a conventional circuit. The stage is coupled by transformers T-7 and T-8 which are tuned by adjustable iron core slugs. Resistor R-27 by-passed by capacitor C-32 provides self-bias for the stage. The gain of this stage is not varied as was the case for the 1st and 2nd i-f amplifier stages. The amplified voltage developed across the secondary of transformer T-8 is then fed to the 2nd detector for demodulation of a-m signals.

**f. A-M 2nd. Detector and A-N-L.** - Both the second detector and automatic noise limiter stages employ a single type 6H6 duo-diode. One diode section of tube V-7 serves as detector for amplitude modulated signals by rectifying the modulated carrier. The r-f filter for this type of detection consists of resistor R-31, and capacitors C-37 and C-38 connected in a pi-section. Automatic volume control voltage and audio frequency voltage is obtained from the load and voltage divider resistors R-33, R-34, R-35. Resistor R-36 serves as a-v-c decoupling. The remaining diode section of tube V-7 serves as automatic noise limiter as follows: Capacitor C-39 becomes charged by the rectified carrier voltage and the time constant of this capacitor and the filter network associated with it is such, that the audio frequency voltage variations do not alter this charge. During a severe noise pulse, however, the cathode of the diode plate connected to capacitor C-39 becomes more negative than the charge held by C-39, hence, current flows shorting the audio voltage to ground through capacitor C-39 until the cathode voltage of the a-n-l diode again reaches a less negative potential than its plate and capacitor C-39 acquires its normal charge again. By shorting the audio voltage to ground during a noise pulse, the a-n-l circuit prevents the objectional noise pulses from reaching the audio amplifier stages.

**g. F-M Limiter and Discriminator.** - The frequency modulation detector consists of a limiter stage and a discriminator stage. The type 6AC7 limiter tube (V-8) is fed by the second i-f transformer secondary winding along with the third i-f amplifier tube V-6 for a-m reception. The limiter stage operates as a saturated amplifier in which the output remains constant over a large range of input voltage levels, thus eliminating variations in the amplitude of the carrier signal to be demodulated by the discriminator. When operating as an f-m receiver, automatic volume control action is obtained by applying a part of the voltage developed across resistor R-41 in the grid return of the limiter tube (V-8), to the control grids of the 1st and 2nd i-f amplifier tubes (V-4 and V-5) through section SW-4A of the F.M./A.M. switch. The constant level signal out of the limiter tube (V-8) is fed to the discriminator tube (V-9) through the discriminator transformer (T-14) and coupling capacitor C-40. The discriminator circuit, consisting of transformer T-9, tube V-9 and load resistors R-45 and R-46, converts the frequency variations of the f-m signal into amplitude variations or the audio signals. The de-emphasis network, consisting of resistor R-47 and capacitor C-47, attenuates the high frequency end of the audio range since these frequencies are emphasized at the f-m transmitter. From the de-emphasis network the audio signal is fed to the A.F. GAIN control (R-48) in the same way as the signal from the amplitude modulation detector tube (V-7).

**h. Audio Amplifier.** - The audio amplifier consists of a conventional high-mu triode class A voltage amplifier driving a single beam power amplifier also operating class A.

## THE HALLICRAFTERS CO.

MODEL S-37

(1) **Voltage Amplifier.** - The voltage amplifier stage employs a type 6SL7GT twin-triode tube with its elements connected in parallel. Self bias voltage obtained from resistor R-49 by-passed by capacitor C-49 provides grid bias voltage for class A operation. The stage operates into its plate load resistor R-50 from which grid voltage for the beam power stage is obtained as well as audio voltage for headset operation. Capacitor C-52 isolates the d-c plate voltage from the headset and beam power amplifier grid.

(2) **Power Amplifier.** - The power amplifier employs a type 6V6GT/G beam-power amplifier in a resistance capacity coupled single ended class A amplifier circuit. Grid bias is obtained from cathode resistor R-53 which is by-passed by capacitor C-50. The output of tube V-11 is coupled to the speaker load by transformer T-10 which provides proper matching for 5000 and 500 ohm loads. When the headset is plugged into the circuit, resistor R-54 is automatically connected across the 5000 - ohm winding to maintain proper load impedance for the beam power stage. If a speaker is connected to the 5000 ohm outlet, it will be automatically disabled when the headset is plugged in. The frequency response of the power amplifier stage is controlled by variable resistor R-52 and capacitor C-51 connected in series from the grid of tube V-11 to ground. As the resistance of R-52 is lowered, the higher audio frequencies are attenuated producing a bass boost effect in the output.

i. **Tuning Meter.** - The tuning meter is switched between two circuits depending upon the type of reception:

(1) **A-M Reception.** - When metering reception of a-m signals the tuning meter measures the plate current of the 2nd i-f amplifier stage which varies as the strength of the signal carrier. Resistor R-55 sets the zero (no signal) position by adjusting the plate current of tube V-5. A carrier then drives the plate current of tube V-5 to a lower value depending upon the signal strength. The screen grid voltage of tube V-5 is regulated by the voltage regulator tube to provide accurate control over the plate current.

(2) **F-M Reception.** - When metering reception of f-m signals the tuning meter measures the unbalanced current in resistors R-45 and R-46 obtained when the receiver is tuned to one side of the f-m carrier. When the receiver is tuned to the exact center of the f-m carrier the meter rests at zero indicating that the currents in the discriminator load resistors are equal. Resistor R-43 functions to limit the maximum current in the meter circuit to a safe value.

j. **Power Supply.** - The receiver has provisions for operation from either an a-c or d-c source.

(1) **A-C Operation.** - The internal power supply provides for operation from 115 or 230-volt a-c mains. The a-c current is fed through a line filter which is a low pass pi-section network connected in each side of the line. The networks consist of inductances L-2 and L-3 and capacitors C-64, C-65, C-66 and C-67. The line filter attenuates all the objectionable noise components coming into the receiver circuit through the a-c power source. The filament and high voltage supply transformers are separate units, each provided with a tapped primary for 115- or 230-volts operation. The taps must be wired accordingly each time the line potential is changed. A type 5U4G (tube V-13) full-wave rectifier is employed in a conventional rectifier circuit. The high voltage from this rectifier is fed to the filter network through the "Shorting Plug" on the rear apron of the receiver chassis as is the filament current for the heaters of the tubes. The SEND-REC. switch is connected in series with the center tap of the high voltage secondary of transformer T-12 and ground to break the high voltage circuit in order to disable the receiver and yet keep the tube heaters hot ready for instant use. The filter circuit consists of two low pass pi-section networks made up of inductances L-4 and L-5 and capacitors C-58, C-57, C-56, C-55 and C-54. In order to provide a constant plate voltage to the oscillator, mixer and screen of the second i-f stages a voltage regulator tube type 0D3/VR-150 is used. The voltage supplied to the screen of tube V-5 is regulated to provide accurate current control for the tuning meter connected in the plate circuit of this tube.

(2) **D-C Operation.** - External storage battery and "B" batteries or storage battery and vibrator type supply provide for d-c operation. When operating from an external d-c supply the "Shorting Plug" on the rear apron of the receiver chassis is removed and a similar plug is wired to supply filament and plate current to the receiver circuits. The "B" voltage is supplied to the input side of the filter section used for a-c operation there by insuring adequate filtering for vibrator type supplies when used.

MODEL S-37

THE HALLICRAFTERS CO.

**ANTENNA CONTROL.** - This control is used to compensate for misalignment of the receiver's antenna stage due to antenna impedance variations. Once set for a given antenna, its setting will hold for a wide range of frequencies.

**R. F. GAIN CONTROL.** - The radio frequency gain control regulates the sensitivity of the receiver. Turning the control to the right increases the sensitivity of the receiver, ganged to this control is the "S" meter switch which connects the tuning meter into the circuit when the control is advanced all the way to the right during automatic volume control operation.

**S-METER ADJ.** - This adjustment sets the signal level meter to its zero signal level position when the receiver is set for A.M. (amplitude modulation) reception. The adjustment is made with a screw driver and once set, it is seldom necessary to make further adjustments.

**POWER SWITCH.** - The power switch connects the a-c power to the receiver when operating from a-c mains only. When operating the receiver from a battery supply this control function must be handled by a power switch in the battery supply circuit.

**CAUTION** - When operating the receiver from a d-c supply set the receiver's POWER switch at OFF and do not plug the a-c line cord into an a-c outlet.

**"S" Meter or Tuning Meter.** - The tuning meter serves two functions in the receiver depending on the type of reception as follows:

**A.M. Reception.** - When the receiver is adjusted to receive amplitude modulated signals, the tuning meter indicates the relative carrier strength of the received signal. To put the meter in operation, turn the R.F. GAIN control to the right until the switch connected to its shaft clicks, and set the A.V.C. switch at ON.

**F.M. Reception.** - When the receiver is adjusted to receive frequency modulated signals, the tuning meter is used to indicate resonance with the station carrier. As the receiver is tuned through the f-m carrier the meter pointer will first deflect to one side of zero, return to zero and deflect an equal distance on the opposite side of zero, and finally return to zero as the carrier is completely passed. The zero center position in the middle of the swing represents the current setting of the receiver tuning dial and indicates resonance with the station carrier.

**OPERATION.**

Listed below are the receiver controls and their settings for the two types of reception provided by this receiver, namely, amplitude modulation reception and frequency modulation reception.

**A. M. (Amplitude Modulation) Reception.** - To receive an amplitude modulated signal, set the panel controls as follows:

- POWER switch - Set at ON when operating receiver on alternating current. To turn off receiver set switch at off.
- CAUTION - Leave switch set at OFF when operating receiver from external batteries.
- SEND/REC. switch - Set at REC. (Set at SEND to disable receiver when desired.)
- A.W./F.M. switch - Set at A.M.

- A.V.C. switch - Set at ON.
- R.F. GAIN control - Turn to right until switch on control clicks.
- TUNING control - Set dial that is calibrated in megacycles to frequency of signal; adjust for maximum tuning meter reading.
- ANTENNA control - Adjust for maximum tuning meter reading.
- A.F. GAIN control - Adjust for desired signal level at headset or speaker.
- tone control - Set to please the listener.
- A.N.L. switch - Normally set at OFF. Use only when background noise is excessive.

**NOTE** - The control settings listed above are those necessary for reception using automatic volume control and meter tuning. Should the operator wish to use manual control of the receiver's sensitivity set the A.V.C. switch at OFF and adjust the R.F. GAIN control for maximum required sensitivity. The tuning meter will not function when manual control of the receiver's sensitivity is employed.

**F.M. (Frequency Modulation) Reception.** - To receive a frequency modulated signal, set the panel controls as follows:

- POWER switch - Set at ON when operating receiver on alternating current. To turn off receiver set switch at OFF.
- CAUTION - Leave switch set at OFF when operating receiver from external batteries.
- SEND/REC. switch - Set at REC. (Set at SEND to disable receiver when desired.)
- A.W./F.M. switch - Set at F.M.
- A.V.C. switch - Set at OFF.
- R.F. GAIN control - Turn all the way to the right. (It is not necessary to actuate the switch.)
- TUNING control - Set dial that is calibrated in megacycles to frequency of signal; adjust for zero setting of tuning meter.
- ANTENNA control - Adjust for maximum signal level in headset or speaker if control is effective. (Adjustment is generally needed only on very weak signals.)
- A.F. GAIN control - Adjust for desired signal level at headset or speaker.
- tone control - Set to please the listener.
- A.N.L. switch - Set at OFF. (not used)

**CAUTION** - Voltages at various points in this equipment are of sufficiently high potential to produce a severe shock. Locate the high potential points on the **VOLTAGE-RESISTANCE DIAGRAM** before attempting to service circuits that are "hot". **IT'S A GOOD RULE TO DISCONNECT THE POWER SOURCE BEFORE MAKING ADJUSTMENTS WHEN POSSIBLE. BE CAREFUL.**

## 1. PREVENTIVE MAINTENANCE

All components of the receiver should be given a thorough inspection at regular intervals. Keep the components clean and dry. Moisture, even in a completely tropicalized set may cause serious deterioration and produce general unsatisfactory operation. Dust and dirt materially effect both electrical and mechanical operation. Keep the various parts clean especially the tuning capacitor and associated gear drive. Dust should be blown out with dry air or brushed out carefully. Do not oil the gear teeth or the condenser wipers as noisy reception will result from intermittent electrical contact at these points. Noisy reception may also be caused by dirty condenser wipers, faulty gain controls, and switches, frayed cable connections, faulty tubes, etc. in the installation. Check accessible connections, switch contacts, etc. regularly making sure that all are clean and tight and the tubes and cable connectors are held securely in their sockets.

## 2. REPLACING TUBES, LAMPS, AND FUSES

**a. Replacing Tubes.** - All tubes with the exception of the four acorn types are accessible at the top of the chassis through the hinged cover of the cabinet. The four acorn type tubes are made accessible by removing the top cover of the r-f section which is held down by thumb screws. The acorn tubes should be inserted with the short end of the body in the socket. Acorn tubes are more fragile than the rest and should be handled accordingly. If the grid and plate clips on the connections to these tubes become loose replace or bend to fit. **DO NOT ATTEMPT TO SOLDER DIRECTLY TO THE TUBE PIN** as the heat generated by the soldering iron will crack the glass envelope. When replacing tubes, check the tube type carefully and replace with the correct tube type. Refer to the top view of the chassis to determine the location of the tubes and to the **PARTS LIST** for the type number and description of each.

**b. Replacing Lamps.** - The receiver employs two lamps with bayonet type sockets to illuminate the vernier dial and the tuning meter. The lamps illuminating the vernier dial scale and tuning meter are to be replaced by a 6/8-volt, 150 ma. (Brown bead) G.E. 47 or equivalent. The color code referred to, is the color of the glass bead above the glass stem inside the envelope of the lamp. The lamp illuminating the meter scale is removed by pulling the lamp socket from the rubber grommet in the meter case. When reinserting the lamp, do not push the socket assembly too far into the meter case as a hot spot of light will appear on the meter scale instead of even area of illumination.

**c. Replacing Fuses.** - Two fuses are used, one in each side of the a-c line. The fuse holders are located on the rear apron of the chassis and require a screw driver to remove the fuse. Replace burned out fuses with 3-ampere 250-volt, Little Fuse type 3AG or equivalent.

**CAUTION** - The fuses protect your equipment, don't take chances using fuses rated for a heavier current drain than 3 amperes.

## 3. PERIODIC ADJUSTMENTS

### a. Tuning Meter Adjustment.

(1) The tuning meter zero setting control is located behind its front panel button type cover marked **S-METER ADJ.** Remove the button with a knife or screw driver blade.

(2) Disconnect the antenna and connect a jumper across terminals  $A_1$ ,  $A_2$ , and GND.

(3) Set the front panel controls for amplitude modulation reception as follows:

(a) Set A.M./F.M. switch at A.M.

(b) Set A.V.C. switch at ON.

MODEL S-37

## THE HALLICRAFTERS CO.

- (c) Turn R.F. GAIN control to right until the switch on the control clicks.
- (d) Set A.F. GAIN control for minimum gain. (All the way to the left).
- (e) Set A.N.L. switch at OFF.
- (f) Set SEND-REC. switch at REC.

(4) With a screw driver set the S-METER ADJ. control for the zero reading on the S-meter scale of the tuning meter.

(5) Remove the antenna terminal jumper and replace antenna leads and meter adjustment cover button, the adjustment is completed.

**b. Receiver Alignment.** - The receiver has been carefully aligned at the factory and should not require realignment until the receiver requires new tubes in the r-f and i-f stages or shows signs of loss of sensitivity, off frequency calibration or requires service work on one or more of its r-f and i-f stages. Alignment should not be attempted by inexperienced personnel as maximum performance is obtained only by careful and intelligent alignment.

(1) Aligning Tools. -

(a) Signal generator capable of providing a 400-cycle modulated signal at 16 mc. and 130 to 210 mc. range. Recommended generators are the Ferris Instrument Corp. Model 18D or 18FS and the Measurements Corp. Model 75.

(b) A 50-ohm non-inductive dummy antenna resistor.

(c) Non-metallic screw driver. A bakelite screw driver with a short metal blade is very good.

(d) Audio output meter capable of handling 5 watts of audio power for either 500 or 5000-ohm loads.

(2) I-F Amplifier Alignment.

(a) Disconnect the grid lead of the type 954 mixer tube (V-3) and connect the signal generator to the grid of the mixer tube, using a small clip or flexible piece of wire to make the connection. Connect the ground wire of the generator to the receiver chassis.

CAUTION - Do not attempt to solder to the tube terminal as the heat of the soldering iron is certain to crack the glass envelope.

(b) Connect the output meter across the speaker terminals. Set the range of the output meter for its highest range to prevent overloading the meter accidentally.

(c) Let the receiver warm up for approximately half an hour then set the receiver controls as follows:

R.F. GAIN control at maximum gain.

A.F. GAIN control at maximum gain permitted by local noise level. Work in a shielded room if possible.

A.M./F.M. switch at A.M.

A.V.C. switch at OFF.

A.N.L. switch at OFF.

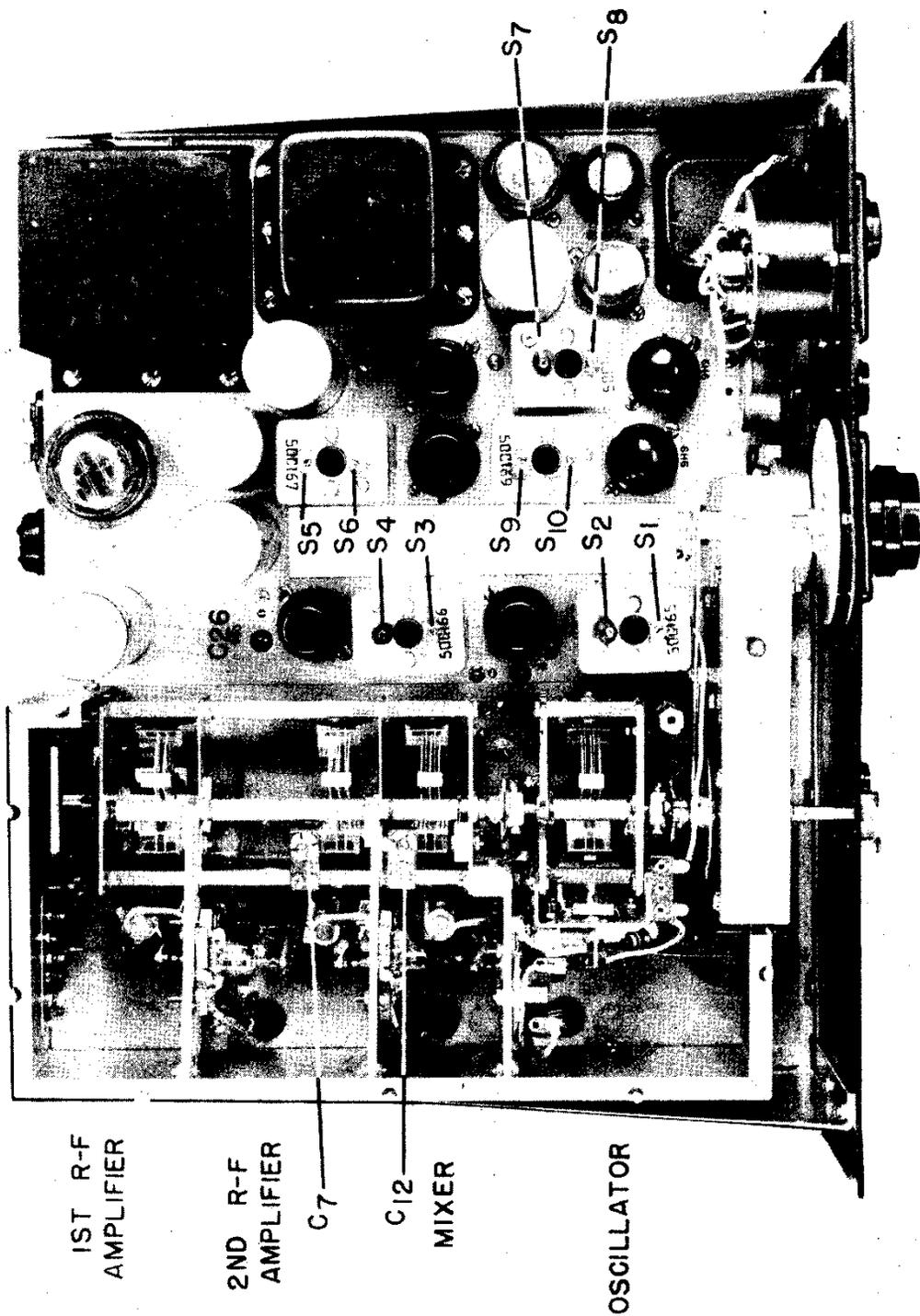
SEND/REC. switch at REC.

(d) Set the signal generator frequency at 16 megacycles and turn on the 400-cycle modulation.

(e) Adjust i-f transformers T-5, T-6, T-7, and T-8 for maximum response by tuning for maximum signal level at the output meter using just enough signal generator output to provide a good resonant swing on the output meter. The signal level at the generator should run not more than 70 microvolts for a 500 milliwatt audio output level. Repeat the alignment procedure until assured of accurate alignment. Refer to

THE HALLICRAFTERS CO.

MODEL S-37



1ST R-F  
AMPLIFIER

2ND R-F  
AMPLIFIER

C7

C12

MIXER

OSCILLATOR

Figure 5-1. Radio Receiver Model S-37, top view showing alignment points.

MODEL S-37

## THE HALLICRAFTERS CO.

figure 5-1 for the location of i-f transformer adjustment screws  $S_1$  through  $S_8$  inclusive on i-f transformers T-5, T-6, T-7, and T-8.

(f) Disconnect the filament lead of the 1st i-f amplifier tube (V-4) at pin #2 of the d-c power input socket (SO-1) on the rear apron of the chassis. Refer to Fig. 7-7. Allow the filament of tube V-4 about one minute to cool off before proceeding.

(g) Increase the output of the signal generator until a readable signal level is indicated by the output meter and adjust neutralizing capacitor C-18 for minimum output. While adjusting capacitor C-18, adjust slug adjustment  $S_3$  on transformer T-6 for maximum output to compensate for detuning caused by adjusting C-18. Repeat the procedure until satisfied that the best possible settings have been obtained.

(h) Reconnect the filament lead of tube V-4 and disconnect the filament lead of the 2nd i-f amplifier tube V-5 at the d-c power input socket. Allow a minute for the tube to cool as before.

(i) Adjust neutralizing capacitor C-26 and slug adjustment  $S_5$  on transformer T-7 for their optimum settings as for the 1st i-f amplifier stage. Reconnect the filament lead again before proceeding.

(j) Detune transformers T-6 (Slugs  $S_3$  and  $S_4$ ) and T-8 (Slugs  $S_7$  and  $S_8$ ) until a fairly high signal generator output is required to produce a readable output meter reading. First adjust transformers T-5 and T-7 for maximum output, then adjust transformer T-8 and finally transformer T-6. Do not readjust transformers T-5 and T-7 when adjusting T-8 and T-6. Reduce the signal generator output as required while bringing these last two i-f transformers into alignment.

### (3) Discriminator Transformer Alignment. -

(a) Set the A.M./F.M. switch at F.M.

(b) Leave the signal generator set at 16 mc. with 400 cycle modulation.

(c) Adjust the secondary slug ( $S_{10}$ ) of the discriminator transformer ( $T_9$ ) for zero signal level at the output meter. Note that this adjustment is critical, therefore turn the screw slowly.

(d) Detune the signal generator from the 16 mc i-f frequency until a readable indication is obtained at the output meter and adjust the primary slug ( $S_9$ ) for maximum output meter reading.

(e) Balance up the discriminator stage as follows:

1. Detune the signal generator to either side of the 16 mc resonant point and note the maximum output meter readings obtained. If they are equal, the discriminator stage is functioning properly, if not, proceed with the balancing adjustment that follows.

2. To balance up an unbalanced condition, tune the signal generator to the resonant point of the weaker peak and tune the primary slug ( $S_9$ ) until the output rises about one-half the difference of the unbalanced readings obtained in step 1. Recheck for balance and repeat the balancing procedure if necessary.

NOTE - If a balance cannot be obtained by adjusting the primary slug ( $S_9$ ), the discriminator's secondary slug ( $S_{10}$ ) has been misadjusted slightly and will require a very slight re-adjustment in either direction. The direction of adjustment that will cause the off-tune peaks to assume the same values is the correct one. Note that the quality of the f-m signal will depend materially upon the degree of balance obtained, hence, a little care will be well repaid in performance.

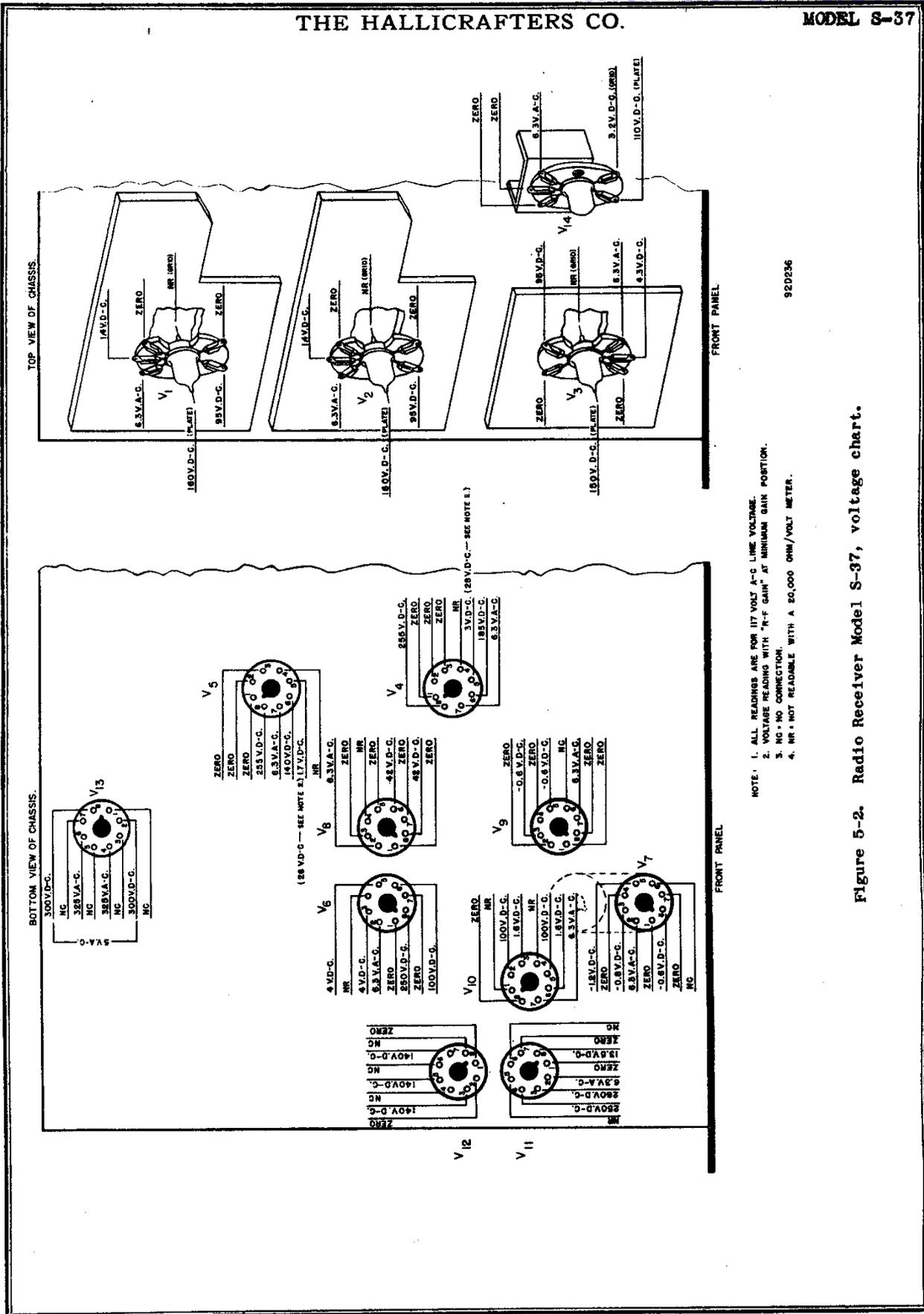
(f) Disconnect the signal generator and reconnect the grid lead to the mixer tube, the alignment of the i-f amplifier stages is completed.

### (4) R-F Amplifier Alignment. -

(a) Connect the signal generator to the "A<sub>1</sub>" antenna terminal through a 50-ohm resistor and connect the ground wire of the signal generator to terminal "A<sub>2</sub>". Disconnect the jumper wire between "A<sub>2</sub>" and "GND" as the generator should not be grounded to the receiver's chassis for the following adjustments.

THE HALLICRAFTERS CO.

MODEL S-37



NOTE: 1. ALL READINGS ARE FOR 117 VOLT A-C LINE VOLTAGE.  
 2. VOLTAGE READING WITH "R-F GAIN" AT MINIMUM GAIN POSITION.  
 3. NR = NO CONNECTION.  
 4. NR = NOT READABLE WITH A 20,000 OHM/VOLT METER.

Figure 5-2. Radio Receiver Model S-37, voltage chart.

MODEL S-37

## THE HALLICRAFTERS CO.

(b) Set the receiver controls as for i-f amplifier alignment. Refer to paragraph 3. b. (2) (c) this section.

(c) Set the signal generator at 210 mc. and turn on 400 cycle modulation.

Note - if your signal generator will not reach 210 mc. use the harmonic of the generator signal.

(d) Set the receiver's TUNING dial at 210 mc. and set the ANTENNA control for maximum output, then adjust capacitors C-7 and C-12 for maximum output while "rocking" the TUNING dial control back and forth across the generator signal. Use just enough signal generator output to provide a readable resonance point at the output meter.

NOTE - Should it be necessary to adjust the frequency of the oscillator to make the receiver's dial reading fall on 210 mc exactly, loosen and shift the heavy wire primary winding (oscillator transformer T-4 primary) nearest to the front panel and the heavy wire coupling loop on the opposite side of the heavy tubing secondary winding. Take care that the coupling between the primary winding and the secondary is not reduced below that necessary to maintain adequate feed back for the oscillator over the entire band. Having obtained proper adjustment recement the winding in place with Amphenol "912" or an equivalent low loss cement. After adjusting the oscillator frequency realign capacitors C-7 and C-12 as described above.

(e) Set the signal generator at 130 mc, tune in the signal on the receiver and check to see that the receiver's main tuning dial reads 130 mc. If not, the secondary (heavy tubular winding) inductance of transformers T-1, T-2, T-3, and T-4 must be adjusted by loosening the clamps and set screws which hold them in place and sliding the transformers back and forth. Tighten all set screws after adjustment.

NOTE - If it is necessary to adjust the inductance of the windings at 130 mc. the adjustments in paragraph (d) must be repeated at 210 mc to bring the high frequency end of the range into alignment again.

(f) Repeat steps (d) and (e) until the receiver alignment and calibration are satisfactory then make the following check to see that the oscillator frequency falls below the signal frequency as it should. For example: Set the receiver dial at 165 mc., turn up the signal generator output to about 5000 times normal, and set the signal generator frequency at twice the i-f frequency lower than 165 mc. or 133 mc. An image signal should be heard. If not, tune the signal generator to twice the i-f frequency higher than the signal frequency or 197 mc. and look for the image there. If the image shows up at the 197 mc. the receiver's oscillator is operating above the signal frequency and must be readjusted so that it falls below the signal frequency. Due to the construction of this receiver it is considered impossible to adjust the oscillator frequency so that it will fall above the signal frequency, however, it is always well to check for the image after making any extensive alignment adjustments.

(g) When completely aligned the overall receiver sensitivity will usually run between 10 to 15 microvolts for 500 milliwatts audio output. If your receiver falls reasonably close to this sensitivity, consider your alignment adjustments satisfactory.

#### 4. LOCATING FAULTS WITH A VOLT-OHM METER

a. Voltage Chart. - Refer to Fig. 5-2. for the tube socket terminal voltages. Voltages shown are those between the terminal and ground (chassis) unless otherwise specified. To identify the tube socket connections, refer to Fig. 7-6. The readings were taken with an RCA Volt Ohmyst Junior analyzer using 20,000 ohm per volt sensitivity. To prepare the receiver for measurement, disconnect the antenna, connect a jumper between the antenna terminals A<sub>1</sub>, A<sub>2</sub>, and GND., disconnect the speaker and replace with a 5000-ohm 10-watt resistor across the 5000-ohm output terminals or a 500-ohm 10-watt resistor across the 500-ohm terminals, and set the controls as follows:

POWER, A.V.C. and A.N.L. switches at ON.

SEND/REC. switch at REC.



MODEL S-37

## THE HALLICRAFTERS CO.

A.M./F.M. switch at A.M.

R.F. GAIN and A.F. GAIN controls at maximum gain position.

ANTENNA TUNING and TONE controls do not effect readings.

b. **Resistance Chart.** - Refer to Fig. 5-3. for the tube socket terminal to ground (chassis) resistance measurements. To identify tube socket connections, refer to Fig. 7-6. The readings were taken with an RCA Volt Ohmyst Junior analyzer. To prepare the receiver for measurement, disconnect the a-c line cord and set the controls as follows:

POWER, A.V.C. and A.N.L. switches at ON.

SEND/REC. switch at REC.

A.M./F.M. switch at A.M.

R.F. GAIN and A.F. GAIN controls at maximum gain position.

TONE control at maximum clock-wise position.

ANTENNA and TUNING controls do not effect readings.

CAUTION - The receiver's line cord, if operating from an a-c outlet, or the battery supply cord, if operating from a d-c supply, must be disconnected before making resistance measurements.

c. **Checking Transformer and Inductor Windings With an Ohm-meter.** -

NOTE - One terminal of each winding measured must be disconnected from the circuit to avoid measuring circuit resistances instead of winding resistance alone as indicated in the chart.

Circuit symbol	Name of part	Winding	Winding terminals	D-C resistance (ohms)
T-10	TRANSFORMER, audio.	Primary.	1 to 2	300
		5000-ohm secondary.	3 to 6	250
		500-ohm secondary.	3 to 5	22
T-11	TRANSFORMER, filament power.	115-volt primary.	± to 115 V.	12
		230-volt primary.	± to 230 V.	40
		6.3-volt secondary.	-	Less than one ohm.
		5.0-volt secondary.	-	Less than one ohm.
T-12	TRANSFORMER, plate power	115-volt primary.	± to 115 V.	7
		230-volt primary.	± to 230 V.	20
		½ secondary.	CT to 288 V.	75
		Secondary	288 V. to 288 V.	150
L-4	REACTOR, filter.	-	1 to 2	85
L-5	REACTOR, filter.	-	-	300

THE HALLICRAFTERS CO.

MODEL S-37

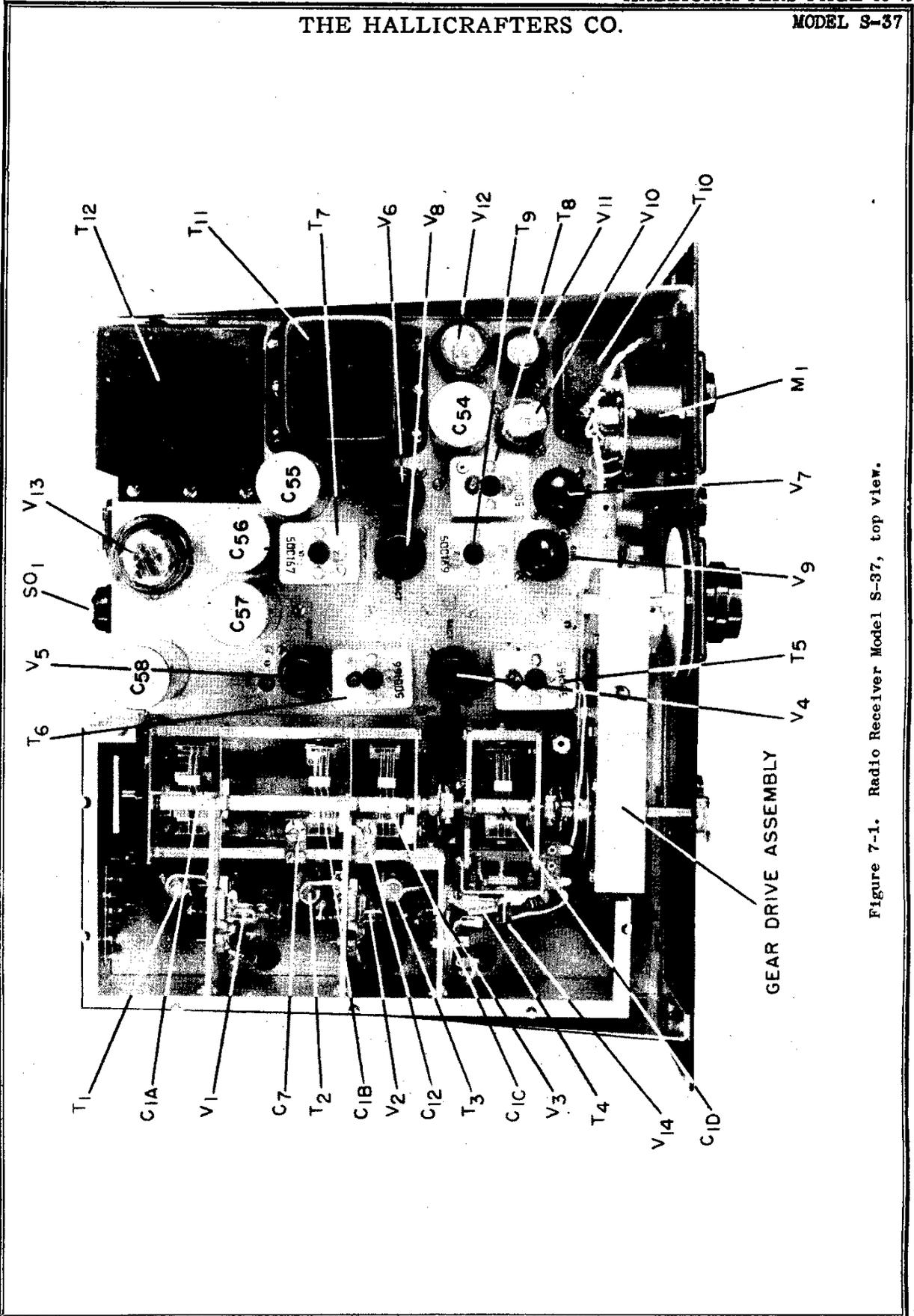


Figure 7-1. Radio Receiver Model S-37, top view.

MODEL S-37

THE HALLICRAFTERS CO.

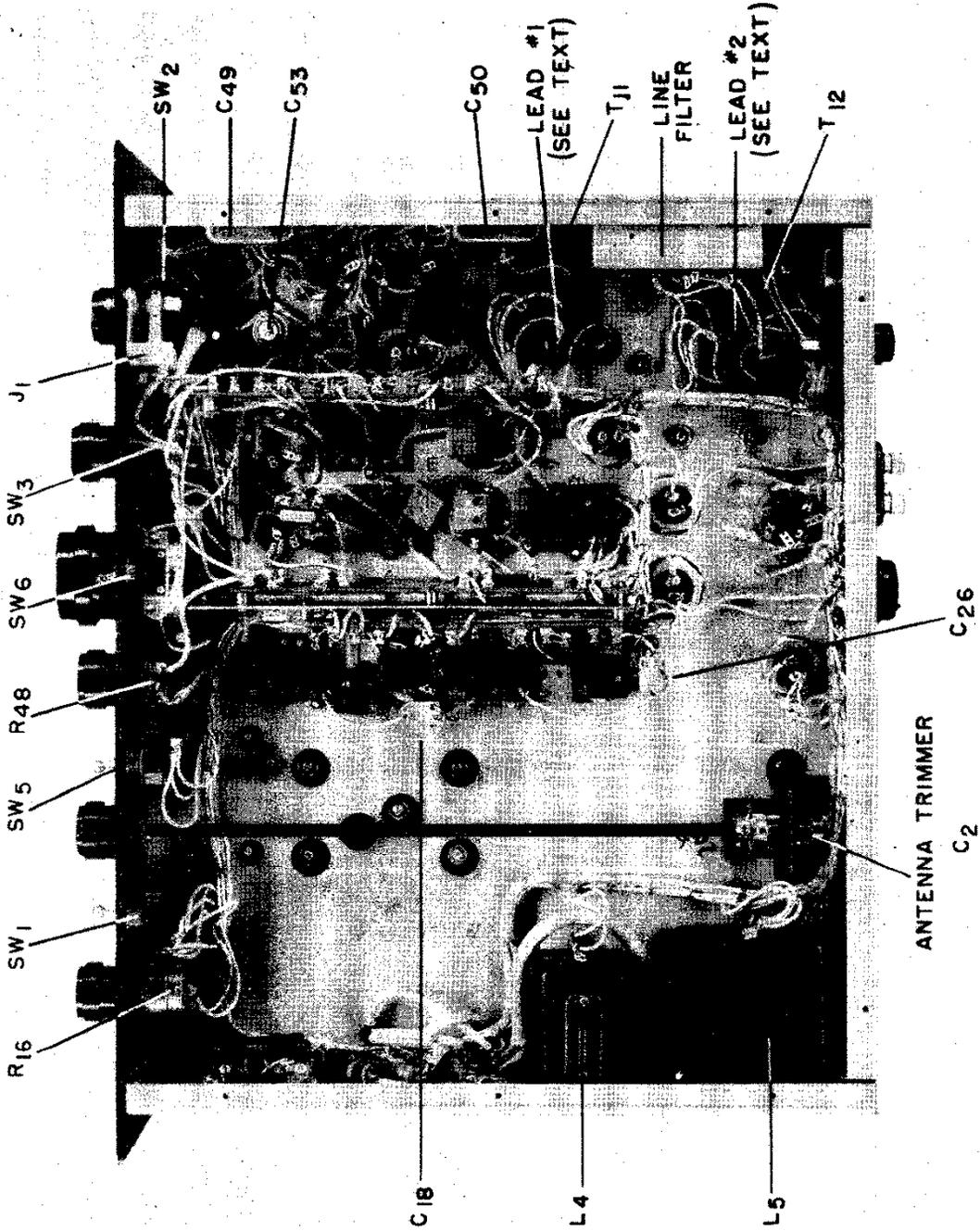


Figure 7-2. Radio Receiver Model S-37, bottom view.

THE HALLICRAFTERS CO.

MODEL S-37

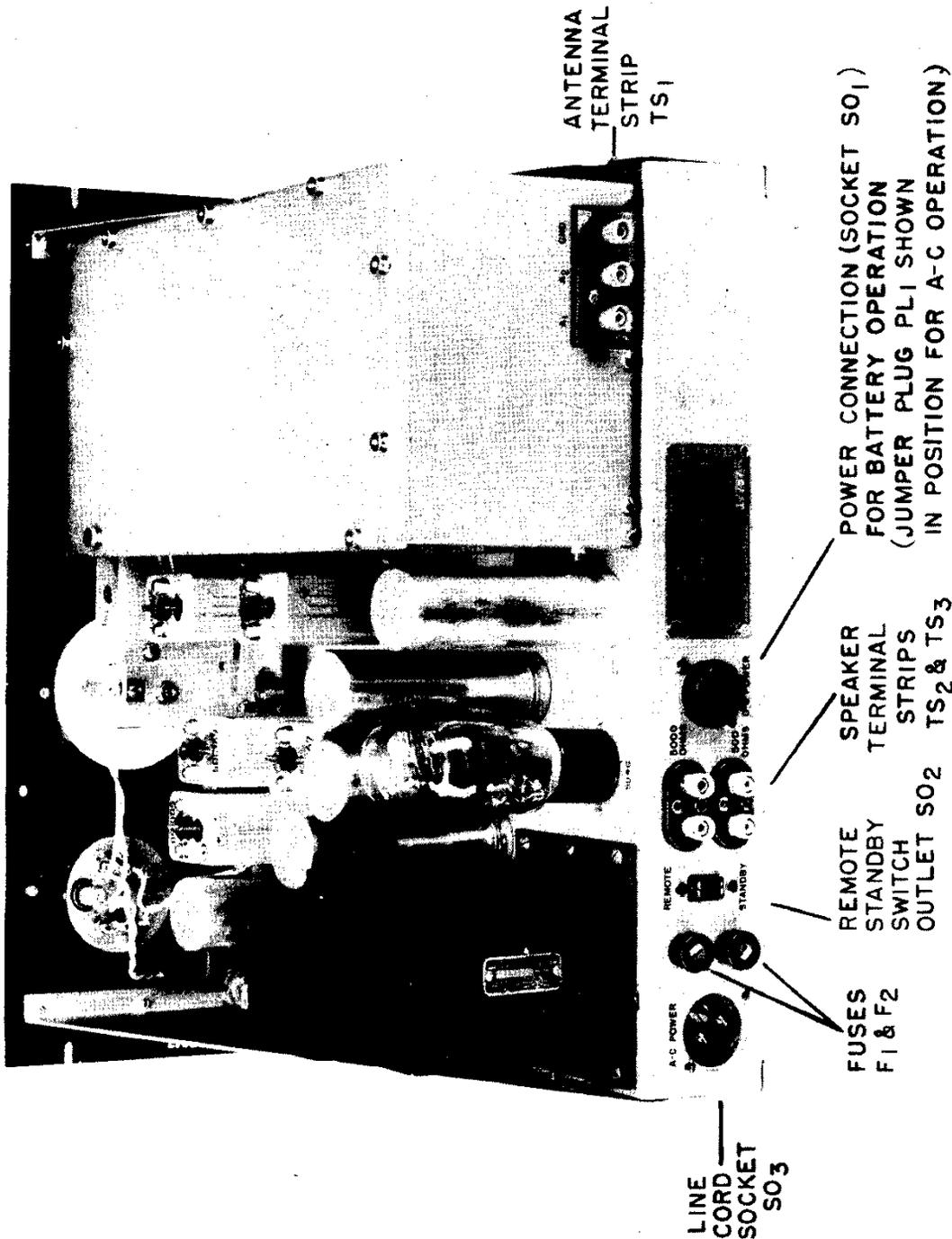


Figure 7-3. Radio Receiver Model S-37, rear view.

MODEL S-37

THE HALLICRAFTERS CO.

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
C17	Capacitor, fixed, mica dielectric; 3900 mmf ± 10%; 500 vdc; case 52/64" x 52/64" x 11/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg; same as C74.	ASA	CR65A322X
C18	Capacitor, variable; ceramic dielectric; 2-6 mmf.; solder lug terminals; same as C26.	CR1	441079
C19	Capacitor, fixed, mica dielectric; 6600 mmf. ± 10%; 500 vdc; case 52/64" x 52/64" x 11/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg; same as C24, C27, C70.	ASA	CR65A522X
C20	Capacitor, fixed, mica dielectric; 2200 mmf ± 20%; 500 vdc; case 52/64" x 52/64" x 9/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg.	ASA	CR65A222U
C21	Same as C14.	-	-
C22	Same as C16; part of transformer T <sub>6</sub> .	-	-
C23	Same as C15; part of transformer T <sub>6</sub> .	-	-
C24	Same as C19.	-	-
C25	Capacitor, fixed, mica dielectric; 3900 mmf ± 10%; 500 vdc; case 52/64" x 52/64" x 9/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg.	ASA	CR65A322X
C26	Same as C18.	-	-
C27	Same as C19.	-	-
C28	Same as C14.	-	-
C29	Same as C15; part of transformer T <sub>2</sub> .	-	-
C30	Same as C15; part of transformer T <sub>2</sub> .	-	-
C31	Not used.	-	-
C32	Capacitor, fixed, mica dielectric; 2200 mmf ± 10%; 500 vdc; case 52/64" x 52/64" x 9/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg; same as C24, C27, C70.	ASA	CR65A222X
C33	Same as C29.	-	-
C34	Capacitor, fixed, mica dielectric; 2200 mmf ± 10%; 500 vdc; case 52/64" x 52/64" x 11/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg.	ASA	CR65A222J
C35	Same as C15; part of transformer T <sub>8</sub> .	-	-
C36	Same as C15; part of transformer T <sub>8</sub> .	-	-
C37	Capacitor, fixed, mica dielectric; 47 mmf ± 10%; 500 vdc; case 52/64" x 52/64" x 9/32"; humidity resistant; two #20 AWG wire leads 1-1/8" lg; same as C26, C36.	ASA	CR20A470K
C38	Same as C37.	-	-
C39	Connector, fixed, paper dielectric; 0.06 mfd ± 20%; 400 vdc; molded bakelite case 1-7/16" lg x 3/4" wd x 2/8" thk; two #20 AWG wire leads 1-3/4" lg.	MTC	40N1000H
C40	Capacitor, fixed, ceramic dielectric; 25 mmf ± 10%; 500 vdc; T.C. negative 0.00075 mfd/mf/degree C; body 0.625" lg x 0.225" diam; two #22 AWG wire leads 1-3/4" lg; part of discriminator transformer T <sub>9</sub> .	ER Type K	47A103

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
C1A	Capacitor, variable; air dielectric; 4 sections, section 1 (C1A), approx. 0 mmf min to 20 mmf max; sections 2 & 3 (C1B and C1C) capacity approx. 5 mmf min to 36 mmf max; section 4 (C2) capacity approx. 5 mmf min to 10.5 mmf max; 6-3/4" lg excluding shaft, shaft 3/4" lg x 0.375/0.375" diam. For sections 1, 2 and 3, shaft for section 4 is 21/32" lg x 3/4" diam; section 1 has 4 plates, sections 2 & 3 have 6 plates each; section 4 has 6 plates, common stator spades for sections 1 and 4; X29 bakelite insulator spade lug mg. bolts not supplied with unit; each section has rotor shaft insulated from other sections; section 4 is separate rotor assembly bolted to main unit so that the plates mesh with section 1 stator plates and has its own drive shaft assembly consisting of a 1 to 1 ratio brass and fibre gear drive assembly.	OM Special	4820067
C1D	Capacitor, variable, single section, effective capacity 25 mmf., air dielectric, unit is ganged to C <sub>1</sub> .	H Special	4820060
C2	Section 4 of Hallcrafters variable capacitor assembly 4820067; refer to description of C <sub>1A</sub> , C <sub>1B</sub> , C <sub>1C</sub> for details.	-	-
C3	Capacitor, fixed, mica dielectric; 330 mmf. ± 20%; 500 vdc; case 52/64" lg x 25/64" wd x 7/32" thk; two #20 AWG wire leads 1-1/8" lg; humidity resistant; same as C <sub>4</sub> , C <sub>5</sub> , C <sub>6</sub> , C <sub>9</sub> , C <sub>11</sub> , C <sub>13</sub> , C <sub>59</sub> , C <sub>61</sub> , C <sub>68</sub> , C <sub>76</sub> , C <sub>77</sub> .	ASA	CR62A331M
C4	Same as C <sub>3</sub> .	-	-
C5	Same as C <sub>3</sub> .	-	-
C6	Capacitor, fixed, ceramic dielectric; 5-64 mmf; 500 vdc; TC-0.00075 mfd/mf/°C; case 0.625" lg x 0.225" dia; two #22 AWG tinned copper or brass wire leads 1-3/4" lg; same as C <sub>10</sub> .	CR1 Type 807001	47A005
C7	Capacitor, variable; polystyrene dielectric; 2 mmf; same as C <sub>12</sub> .	H Special?	44A081
C8	Same as C <sub>3</sub> .	-	-
C9	Same as C <sub>3</sub> .	-	-
C10	Same as C <sub>6</sub> .	-	-
C11	Same as C <sub>3</sub> .	-	-
C12	Same as C <sub>7</sub> .	-	-
C13	Same as C <sub>3</sub> .	-	-
C14	Capacitor, fixed, mica dielectric; 2200 mmf. ± 10%; 500 vdc; case 52/64" x 52/64" square x 11/32" thk; humidity resistant; two #18 AWG wire leads 1-1/8" lg; same as C <sub>23</sub> , C28.	ASA	CR65A222J
C15	Capacitor, fixed, ceramic dielectric; 80 mmf. ± 10%; 500 vdc; T.C. 0.00075 max negative; body 7/16" lg x 7/32" diam; two #22 AWG wire leads 1-3/4" lg; part of transformer T <sub>9</sub> .	ER Type K	47A081
C16	Same as C15; part of transformer T <sub>9</sub> .	-	-

THE HALLICRAFTERS CO.

MODEL S-37

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters Part No.
C <sub>66</sub>	Same as C <sub>65</sub> .	-	-
C <sub>67</sub>	Same as C <sub>65</sub> .	-	-
C <sub>68</sub>	Capacitor, fixed: silver mica dielectric; 150 mfd ± 20%; 500 vdc; buttom type; 13/32" x 38/64" diam; 2 solder lug terminals; mfg hole tapped #3-48 x 11/64" d.	ER 370-A	47A135
C <sub>69</sub>	Not used.	-	-
C <sub>70</sub>	Same as C <sub>65</sub> .	-	-
C <sub>71</sub>	Capacitor, fixed: ceramic dielectric; 100 mfd ± 5 mfd; 600 vdc; T.C. positive 0.0007 mfd/mf/degree C; body 11/16" lg x 7/32" diam; vacuum wax impregnated; two #20 AWG wire leads 1-3/8" lg; part of oscillator transformer T <sub>4</sub> .	ER N-700L	47A108
C <sub>72</sub>	Same as C <sub>65</sub> .	-	-
C <sub>73</sub>	Same as C <sub>65</sub> ; part of transformer T <sub>7</sub> .	-	-
C <sub>74</sub>	Same as C <sub>17</sub> .	-	-
C <sub>76</sub>	Not used.	-	-
C <sub>78</sub>	Same as C <sub>19</sub> .	-	-
F <sub>1</sub>	Fuse, cartridge: 3 amp 250-volt; 3 AG; glass enclosed; ferrule cap; same as F <sub>2</sub> .	LF 1043	39A301
F <sub>2</sub>	Same as F <sub>1</sub> .	-	-
J <sub>1</sub>	Jack, telephone; headphones; short; takes standard tip and sleeve; mounts by bushing 3/8"-32x3/8"; furnished with one brass hex nut and one brass nt pl 5/8" OD washer; solder lug terminals.	U type 87-827	38B011
L <sub>1</sub>	Coil, r-f; 15.5 oh ± 10%; distributed capacity 1 mfd ± 20%; d-c resistance 4-10 ohms ± 5%; 40" with 100 mfd capacity 65 ± 15%; 75 turns #18 SWG wire on molded natural bakelite rod 15/16" lg x 5/32" diam; ten wire leads 1-3/8" lg; Chinese red lacquer coating.	SW1 Special	63A008
L <sub>2</sub>	Coil, filler; 11m; 46 oh; 57 turns #22 SWG wire, unblew-mal winding; wound on glazed ceramic form 1" lg x 3/8" diam, tapped #6-32 x 7/16" d; winding is 1" lg x 1-1/8" diam; two extended leads with spaghetti covering; tape over spaghetti and leads to prevent leads breaking; same as L <sub>3</sub> .	SW1 Special	63A006
L <sub>3</sub>	Same as L <sub>2</sub> .	-	-
L <sub>4</sub>	Coil, filler; input; 2 henries ± 10%; rated d-c current 150 ma; d-c resistance 85 ohms ± 10%; iron core; 1800 turns of #31 enameled copper wire; metal case 3-5/8" h x 2-3/16" wd x 2-11/16" lg; mfg flange has six mfg holes 3 on each side, of 3/32" diam, spaced 3/4" apart, on 2-3/8" mfg centers; two lug terminals on top of case, each terminal 3/16" diam, spaced 5/8" apart; coil is vacuum wax impregnated; voltage breakdown 2400 volts A.M.S. between coil and core or coil and case.	CTC Type 7488	65B011
L <sub>5</sub>	Coil, filler; output; 12 henries; rated d-c current 90 ma; d-c resistance 208 ohms at 75°C; test voltage 2400 volt r.m.s. between coil and core or coil and case; hermetically sealed in metal case 3-1/16" h x 2-3/16" wd x 2-3/8" lg; four #8-32 NC threaded mfg studs on 1-3/8" x 1-3/4" mfg centers; hardware included; two lug terminals on top spaced 22-32" apart.	CTC Type 7980	65B012

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters Part No.
C <sub>41</sub>	Same as C <sub>15</sub> ; part of discriminator transformer T <sub>8</sub> .	-	-
C <sub>42</sub>	Same as C <sub>15</sub> ; part of discriminator transformer T <sub>8</sub> .	-	-
C <sub>43</sub>	Same as C <sub>62</sub> .	-	-
C <sub>44</sub>	Same as C <sub>62</sub> .	-	-
C <sub>45</sub>	Capacitor, fixed: mica dielectric; 370 mfd ± 10%; 500 vdc; case 51/64" x 19/32" wd x 7/32" thk; humidity resistant; two #20 AWG wire leads 1-1/8" lg; same as C <sub>17</sub> .	ASA C80A421K	
C <sub>46</sub>	Same as C <sub>17</sub> .	-	-
C <sub>47</sub>	Same as C <sub>15</sub> .	-	-
C <sub>48</sub>	Capacitor, fixed: mica dielectric; 8500 mfd ± 10%; 500 vdc; case 63/64" x 53/64" x 11/32"; humidity resistant; two #18 AWG wire leads 1-1/8" lg; same as C <sub>41</sub> , C <sub>42</sub> , C <sub>64</sub> , C <sub>65</sub> , C <sub>68</sub> , C <sub>67</sub> .	ASA C80A822K	
C <sub>49</sub>	Capacitor, fixed: electrolytic; 20 mfd ± 20 ± 80%; 100 vdc; bathub metal case 1-3/4" lg x 1" wd x 13/16" h, excluding lugs; two mfg lugs with 3-1/8" mfg/c; two solder lug terminals; same as C <sub>50</sub> .	IC type 100B220	48B053
C <sub>50</sub>	Same as C <sub>49</sub> .	-	-
C <sub>51</sub>	Same as C <sub>48</sub> .	-	-
C <sub>52</sub>	Same as C <sub>48</sub> .	-	-
C <sub>53</sub>	Capacitor, fixed: paper dielectric; 0.005 mfd ± 20%; 1000 vdc; round metal case 2-3/8" h x 11/16" diam; oil filled; one mfg hole 9/16" from center of unit on mfg base; mfg hole .178"/.189" diam; base is one terminal, can is other lug on top is other terminal.	IC type T16040	49A007
C <sub>54</sub>	Capacitor, fixed: paper dielectric; 4 mfd ± 10%; 600 vdc; tubular metal case 4-1/2" lg x 3-1/2" diam, over-all; mfd by bushing having 3/4"-16 NF-2 (hd) nut and lock washer inclined solder lug is one terminal, can is other terminal; same as C <sub>55</sub> , C <sub>66</sub> , C <sub>67</sub> , C <sub>68</sub> .	CD type T16040	49A016
C <sub>55</sub>	Same as C <sub>54</sub> .	-	-
C <sub>56</sub>	Same as C <sub>54</sub> .	-	-
C <sub>58</sub>	Same as C <sub>54</sub> .	-	-
C <sub>59</sub>	Same as C <sub>54</sub> .	-	-
C <sub>60</sub>	Capacitor, fixed: mica dielectric; 330 mfd ± 10%; 500 vdc; case 51/64" lg x 15/32" wd x 7/32" thk; humidity resistant; two #20 AWG wire leads 1-1/8" lg.	ASA C80A31K	
C <sub>61</sub>	Same as C <sub>46</sub> .	-	-
C <sub>62</sub>	Same as C <sub>3</sub> .	-	-
C <sub>63</sub>	Same as C <sub>3</sub> .	-	-
C <sub>64</sub>	Same as C <sub>48</sub> .	-	-
C <sub>65</sub>	Same as C <sub>48</sub> .	-	-

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
R <sub>13</sub>	Resistor, fixed; 100,000 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg; same as R <sub>15</sub> , R <sub>33</sub> .	ASA	RC21AE104K
R <sub>14</sub>	Resistor, fixed; 350 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg; same as R <sub>24</sub> , R <sub>33</sub> , R <sub>60</sub> .	ASA	RC21AE351K
R <sub>15</sub>	Same as R <sub>13</sub> .	-	-
R <sub>16</sub>	Resistor, variable; 10,000 ohm ± 20%; carbon; ½ watt; composition; capacitor; shaft, 1" long x ¼" diam; 3 solder lug terminals; center lug is variable contact; includes switch SW <sub>3</sub> .	CT type 133	260088
R <sub>17</sub>	Resistor, fixed; 39,000 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE391K
R <sub>18</sub>	Resistor, variable; 300 ohm ± 20%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE31M
R <sub>19</sub>	Same as R <sub>13</sub> ; part of transformer T <sub>6</sub> .	-	-
R <sub>20</sub>	Resistor, fixed; 100,000 ohm ± 20%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg; same as R <sub>17</sub> , R <sub>33</sub> , R <sub>60</sub> .	ASA	RC21AE104K
R <sub>21</sub>	Same as R <sub>11</sub> .	-	-
R <sub>22</sub>	Resistor, fixed; 150 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE151K
R <sub>23</sub>	Same as R <sub>13</sub> .	-	-
R <sub>24</sub>	Same as R <sub>14</sub> .	-	-
R <sub>25</sub>	Same as R <sub>11</sub> .	-	-
R <sub>26</sub>	Not used.	-	-
R <sub>27</sub>	Resistor, fixed; 560 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE561K
R <sub>28</sub>	Resistor, fixed; 7000 ohm ± 10%; 10 watt; wire wound; vitreous baked enamel coated; 1-3/4" lg x 3/8" max diam; two #18 AWG wire leads 1-2/8" lg.	V type CC	2400752E
R <sub>29</sub>	Same as R <sub>13</sub> .	-	-
R <sub>30</sub>	Resistor, fixed; 1000 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE101K
R <sub>31</sub>	Resistor, fixed; 47,000 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg; same as R <sub>33</sub> .	ASA	RC21AE471K
R <sub>32</sub>	Resistor, fixed; 1 megohm ± 20%; ½ watt; composition; insulated; humidity resistant; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-½" lg.	ASA	RC21AE106M
R <sub>33</sub>	Same as R <sub>13</sub> .	-	-

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
T <sub>6</sub>	Coil, P-F; 4-2 ohm ± 10%; distributed capacity 1 mf ± 20%; d-c resistance 0.25 ohm ± 10%; "Q" with 100 mf capacitor 100 ± 20%; 42 turns #28 EBC copper wire on selected natural bakelite form 7/8" lg x 9/32" diam; Chinese blue lacquer coated; two copper wire leads 1-3/8" lg.	SWI Special	53A009
IM <sub>1</sub>	Lamp, incandescent; pilot; 6-8 volt, 0.15 amp; bayonet type base.	GE type 47	39A004
IM <sub>2</sub>	Same as IM <sub>1</sub> .	-	-
PI <sub>1</sub>	Connector, male contact; metal; molded bakelite body, 1" x 1/2" x 1-3/8" diam overall; prongs are numbered from 1 to 5 on both sides; includes insulated jumper between 3 and 4 and one between 5 and 7.	AP type CP-9	35A001
M <sub>1</sub>	Motor, micro; diameter: range 100-40 microamperes; accuracy ± 20% of full scale length 1.50" covered in 30" of pointer swing; approx resistance 1250 ohm d-c; damping factor 8 (W) scale length; metal case 1-5/16 d x 2-3/4" diam; mtd by metal flange 3-1/4" diam having 3 mlg holes 1-9/16" diam spaced 120° apart on 1-3/16" radius; two stud terminals at rear 5/8" long x #10-32 thread; flange is part of case.	B Special	62A006
R <sub>1</sub>	Resistor, fixed; 2.2 ohm ± 10%; ½ watt; composition; insulated; 7/16" lg x 0.215" diam; two #18 AWG leads 1-3/4" lg; part of transformer T <sub>1</sub> .	EP type 504	23A016
R <sub>2</sub>	Resistor, fixed; 270 ohm ± 10%; ½ watt; composition; humidity resistant; insulated; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg; same as R <sub>17</sub> , R <sub>33</sub> .	ASA	RC21AE271K
R <sub>3</sub>	Resistor, fixed; 1000 ohm ± 20%; ½ watt; composition; humidity resistant; insulated; 0.005" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg; same as R <sub>4</sub> , R <sub>6</sub> , R <sub>7</sub> , R <sub>9</sub> , R <sub>10</sub> , R <sub>29</sub> , R <sub>30</sub> .	ASA	RC21AE101K
R <sub>4</sub>	Same as R <sub>3</sub> .	-	-
R <sub>5</sub>	Same as R <sub>3</sub> .	-	-
R <sub>6</sub>	Same as R <sub>3</sub> .	-	-
R <sub>7</sub>	Same as R <sub>3</sub> .	-	-
R <sub>8</sub>	Resistor, fixed; 12,000 ohm ± 10%; 2 watt; composition; insulated; humidity resistant; 1-7/8" lg x 0.942" diam; two #19 AWG wire leads 1-1/2" lg.	ASA	RC21AE12K
R <sub>9</sub>	Same as R <sub>3</sub> .	-	-
R <sub>10</sub>	Same as R <sub>3</sub> .	-	-
R <sub>11</sub>	Resistor, fixed; 33 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.488" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg; same as R <sub>31</sub> , R <sub>35</sub> , R <sub>39</sub> , R <sub>44</sub> .	ASA	RC21AE331K
R <sub>12</sub>	Resistor, fixed; 100,000 ohm ± 10%; ½ watt; composition; insulated; humidity resistant; 0.488" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg; part of transformer T <sub>3</sub> . Same as R <sub>19</sub> , R <sub>35</sub> , R <sub>40</sub> .	ASA	RC20AE104K

THE HALLICRAFTERS CO.

MODEL S-37

Ref. Symbol	Name of Part and Description	Mfr. Code and Type No.	Hallcrafters' Part No.
R <sub>35</sub>	Resistor, variable: 1500 ohm ± 20%; wire wound; at low taper; shaft, 3/8" long x 1/4" diam, slotted 1/16" x 1/16"; 3 solder lug terminals with variable contact located in the center and fixed contacts 1-7/16" apart; no lugs.	CT type 125	23C040
R <sub>36</sub>	Resistor, fixed: 3,200 ohm ± 10%; 10 watt; wire wound; vitreous enamel coated; 1-3/4" lg x 3/9" max diam; two #18 AWG wire leads 1-3/8" long.	U type CC	24B032E
R <sub>37</sub>	Resistor, fixed: 22,000 ohm ± 20%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A2223M
R <sub>38</sub>	Resistor, fixed: 3900 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A3926K
R <sub>39</sub>	Resistor, fixed: 5,600 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A5626K
R <sub>40</sub>	Same as R <sub>34</sub> .	-	-
R <sub>41</sub>	Resistor, fixed: 180,000 ohm ± 20%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A1814M
R <sub>42</sub>	Resistor, fixed: 8 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 7/16" lg x 0.215" diam; two #21 AWG wire leads.	ER type 604 ASA	23A019
R <sub>43</sub>	Resistor, fixed: 27,000 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG leads 1-3/8" lg. Part of transformer T <sub>9</sub> .	-	RC20A273K
R <sub>44</sub>	Same as R <sub>41</sub> .	-	-
S <sub>01</sub>	Connector, female contact: octal; high dielectric mica filled bakelite body, 1-7/64" diam x 31/64" thick; silver plated phosphor bronze solder lugs; molded on steel) meg plate 1-9/32" wd x 0.031" thk having 2 mtg holes of 5/32" diam x 1-3/8" mtg centers; pins are numbered on back of socket clockwise from locating pin.	AP type M1P24	64600
S <sub>02</sub>	Connector, female contact: two terminal; bakelite body, 1/16" wd x 3/8" h x 29/32" d x 1-5/8" x 1-3/4" overall; mounted by cad plated steel plate having 2 mtg holes with 1-1/8" mtg centers; 2 solder lug terminals 5/16" lg x 1/4" wd, rated 10 amp at 250 volts, 15 amp at 125 volts.	AL type 4002-T	10M015
S <sub>03</sub>	Connector, male contact: recessed; two brass prongs; screw type terminals; 1-3/8" x 1-5/8" x 1-1/4" overall; molded bakelite body recessed in metal cup 1-3/8" diam with flange type mtg having 1-3/4" mtg centers, mtg holes 0.144" diam.	AP type 60M-10	10M047
S <sub>04</sub>	Switch, toggle; SRT; power; rated 3 amp at 250-volt; black enamel steel case 13/16" h x 10/32" d x 3/8" wd; 2 solder lug terminals; mounts by brass bushing 15/32" x 3/8" to fit a 3/8" hole; mechanism is brass; lugs separated by fibre pieces; same as S <sub>03</sub> , S <sub>05</sub> .	HR type 20004	60A116
S <sub>05</sub>	Same as S <sub>04</sub> .	-	-

Ref. Symbol	Name of Part and Description	Mfr. Code and Type No.	Hallcrafters' Part No.
R <sub>34</sub>	Resistor, fixed: 270,000 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg; same as R <sub>35</sub> , R <sub>41</sub> , R <sub>40</sub> .	ASA	RC21A274K
R <sub>35</sub>	Same as R <sub>34</sub> .	-	-
R <sub>36</sub>	Resistor, fixed: 470,000 ohm ± 20%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A474M
R <sub>37</sub>	Same as R <sub>30</sub> .	-	-
R <sub>38</sub>	Same as R <sub>31</sub> .	-	-
R <sub>39</sub>	Same as R <sub>11</sub> .	-	-
R <sub>40</sub>	Resistor, fixed: 3,900 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 1.78" lg x 0.248" diam; two #19 AWG wire leads 1-3/8" lg.	ASA	RC21A3926K
R <sub>41</sub>	Same as R <sub>34</sub> .	-	-
R <sub>42</sub>	Resistor, fixed: 3000 ohm ± 10%; 1 watt; composition; insulated; humidity resistant; 1.28" lg x 0.310" diam; two #20 AWG wire leads 1-3/8" lg.	ASA	RC21A3026K
R <sub>43</sub>	Resistor, fixed: 330,000 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads.	ASA	RC21A334K
R <sub>44</sub>	Same as R <sub>42</sub> .	-	-
R <sub>45</sub>	Same as R <sub>42</sub> ; part of transformer T <sub>9</sub> .	-	-
R <sub>46</sub>	Same as R <sub>42</sub> ; part of transformer T <sub>9</sub> .	-	-
R <sub>47</sub>	Resistor, fixed: 220,000 ohm ± 20%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A224V
R <sub>48</sub>	Resistor, variable: 1 megohm ± 20%; carbon; shaft 1" long x 1/4" diam; 3 solder lug terminals with variable contact located in the center and fixed contacts 1-7/16" apart; no taps.	CR type 1-010	25C069
R <sub>49</sub>	Resistor, fixed: 3000 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" long.	ASA	RC21A3026K
R <sub>50</sub>	Same as R <sub>34</sub> .	-	-
R <sub>51</sub>	Resistor, fixed: 470,000 ohm ± 10%; 1/2 watt; composition; insulated; humidity resistant; 0.055" lg x 0.249" diam; two #21 AWG wire leads 1-3/8" lg.	ASA	RC21A474K
R <sub>52</sub>	Resistor, variable: 600,000 ohm ± 20%; carbon; 1/8" taper; shaft 1" lg x 1/4" diam; 3 solder lug terminals with variable contact between the outer lug terminals; terminals 1-7/16" apart; no taps.	CT type 31	25C065
R <sub>53</sub>	Same as R <sub>34</sub> .	-	-
R <sub>54</sub>	Resistor, fixed: 4700 ohm ± 20%; 1 watt; composition; insulated; humidity resistant; 1.28" lg x 0.310" diam; two #20 AWG wire leads 1-3/8" lg.	ASA	RC21A474M

MODEL S-37

THE HALLICRAFTERS CO.

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
T <sub>4</sub>	wd x 3/4" h x 6/32" thick mounted on coil form by a 1/2" nickel plated brass screw; grid lead is insulated by 3 amphebol #222 beads #73-1.  Transformer, r-f; pri, 1-3 turns of #16 tinned copper wire; sec, 1-3 turns of silver plated copper tubing 1/8" O.D. x 1/16" I.D.; sec winding spaced 1/32"; sec leads are 1-3/4" and 1-3/32" lg respectively; pri leads are 1-3/4" wd x 1-3/4" lg respectively and extending from the coil at a 90 degree angle; capacitor C <sub>11</sub> is soldered 1 turn from longest lead of sec; coils are wound on polystyrene from 1-3/4" lg x 3/8" diam; pri is slightly sealed to coil form for shipping, seal may easily be broken for adjustment.	EW Special	BLANDS
T <sub>5</sub>	Transformer, IF: 16 megacycles; input stage; shielded; shield can 1-7/8" lg x 1-7/16" wd x 4" h; powdered iron core; tuned primary and secondary; adjustable from core tuning; spade lug mtg on 1-7/8" x 1-7/16" mtg centers; 8 solder lug terminals at base; includes capacitors C <sub>15</sub> and C <sub>16</sub> and resistor R <sub>13</sub> .	EW Special	60C106
T <sub>6</sub>	Transformer, IF: 16 megacycles; intermediate; shielded; shield can 1-7/8" lg x 1-7/16" wd x 4" h; powdered iron core; tuned primary and secondary; adjustable from core tuning; spade lug mtg on 1-7/8" x 1-7/16" mtg centers; 8 solder lug terminals at base; includes capacitors C <sub>25</sub> and C <sub>26</sub> , and resistor R <sub>10</sub> .	EW Special	60C106
T <sub>7</sub>	Transformer, IF: 16 megacycles; interstage; shielded; shield can 1-7/8" lg x 1-7/16" wd x 4" h; powdered iron core; tuned primary and secondary; adjustable from core tuning; spade lug mtg on 1-7/8" x 1-7/16" mtg centers; 8 solder lug terminals at base; includes capacitors C <sub>29</sub> , C <sub>30</sub> and C <sub>31</sub> .	EW Special	60C107
T <sub>8</sub>	Transformer, IF: 16 megacycles; diode; shielded; shield can 1-7/8" lg x 1-7/16" wd x 4" h; powdered iron core; tuned primary and secondary; adjustable from core tuning; spade lug mtg on 1-7/8" x 1-7/16" mtg centers; 8 solder lug terminals at base; includes capacitors C <sub>35</sub> and C <sub>36</sub> .	EW Special	60C109
T <sub>9</sub>	Transformer, IF: 16 megacycles; discriminator; shielded; shield can 1-7/8" lg x 1-7/16" wd x 4" h; powdered iron core; tuned primary and secondary; adjustable from core tuning; spade lug mtg on 1-7/8" x 1-7/16" mtg centers; 8 solder lug terminals at base; includes capacitors C <sub>40</sub> , C <sub>41</sub> and C <sub>42</sub> , and resistors R <sub>14</sub> , R <sub>15</sub> and R <sub>16</sub> .	EW Special	60C109
T <sub>10</sub>	Transformer, AF: audio output; two windings; primary to match output of tube V <sub>11</sub> (6X6GT), secondary to match 5000 ohm load; tapped to match 500 ohm load; enclosed in metal case.	R Special	60B012
T <sub>11</sub>	Transformer, power; filament; primary for 230 volts, 60 cycles with tap for 115-volts; #1 secondary 3 amp 5 volts; #2 secondary 4 amp 0.3 volts; coil and core potted and sealed in metal case 3-15/16" x 5-1/4" x 4" overall, 2 mtg flanges each having 3 mtg holes 7/32" diam spaced 1-1/8" apart, 2 sets of mtg holes have 3-3/4" x 9-3/4" mtg centers.	R Special	62A104

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters' Part No.
SW <sub>3</sub>	Switch, toggle; SPST; mounts on back of R.F. GAIN control and closes when the R.F. GAIN control is turned all the way to the right (clockwise); part of R.F. GAIN control.	OM type OH	60A177
SW <sub>4</sub> SW <sub>5A</sub> SW <sub>5B</sub> SW <sub>5C</sub> SW <sub>5D</sub>	Switch, rotary; single section; 2 position; all metal parts silver plated brass except for stainless steel lock spring and ball; vacuum wax impregnated phenolic wafers; non shorting teeth of contacts 5 and 6; frame 5/16" lg; mtg by 3/8-32 bumping 3/4" lg, shaft 1" lg x 3/4" diam.	RE	60A117
SW <sub>6</sub> SW <sub>7</sub>	Same as SW <sub>4</sub> . Switch, toggle; DPST; rated 1 amp at 250-volts, 3 amp at 125-volts; metal case, 1-9/16" x 10/32" overall diam; includes three separations in assembly; 4 brass lug terminals; mtg by brass bumping 15/32-32 x 13/32".	EW Special	61A350
T <sub>1</sub>	Transformer, r-f; sec, 2 turns of 1/8" O.D. x 1/16" I.D. copper tubing, silver plated; pri, 1-3 turns of #28 tinned and silver beaded cellulose size securing thru hole may grid lead, stranded voice coil wire 3/41 lg; spacing between sec turns not less than 1/32"; coil wound on polystyrene form 1-15/16" lg x 3/8" diam; includes resistor R <sub>1</sub> ; mounted thru center of form 3/4" from top end; one lead of resistor soldered to sec about 1-3/8" turns from winding start; the other lead is cut short and the grid lead with corn tube clip is attached to the start end of the sec extends 37/32" from the center of the coil form and is flattened 3/16" from the center of the coil form; the primary terminals are two solder lug terminals which are mounted on a ceramic terminal 5/8" x 2/4" h x 6/32" thick which is mtg near the bottom of the coil form by a 3" nickel plated brass screw; start and finish leads of sec extend from coil at a 90 degree angle.	EW Special	61A351
T <sub>2</sub>	Transformer, r-f; pri, 2-3 turns of #28 enameled single silk covered wire; spaced one wire diam; sec, 2 turns of silver plated copper tubing 3/8" O.D. x 1/16" I.D.; grid lead is voice coil wire 1-3/4" lg with corn tube clip and soldered on sec 2 turns from winding start; spacing between sec turns not less than 1/32"; the start end of the sec extends 3/4" from center of coil form and is flattened 3/16" from center of coil form; coils are wound on polystyrene from 1-7/16" lg x 3/8" diam at one end and 5/16" diam at other end; secondary leads terminate as two solder lug terminals which are mtg on a ceramic terminal 5/8" x 2/4" h x 3/32" thick which mounts to coil form by a 3" nickel plated brass screw; grid lead insulated by 2 amphebol #219 beads #73-1; start and finish leads of sec extend from coil at a 90 degree angle.	EW Special	61A352

THE HALLICRAFTERS CO.

MODEL S-37

SUPPLEMENTARY DATA

AUDIO POWER OUTPUT.

Speaker operation - 2 watts with less than 5% distortion  
 Headset operation - High impedance.

SENSITIVITY.

At 130 mc. - 15 microwatts. (For 500 milliwatt audio output.)  
 At 200 mc. - 7 microwatts, (For 500 milliwatt audio output.)

SIGNAL TO NOISE RATIO.

Not less than 5 to 1 when measured with a 3.5 microvolt, 400-cycle 30% modulated signal.

AUDIO FIDELITY.

Audio response is flat within  $\pm$  4 db. from 100 to 10,000 cycles per second.

IMAGE RATIO.

Not less than 60 db. between 130 mc. and 210 mc.

SELECTIVITY.

I-F selectivity measured at the grid of the mixer tube is not less than 140 kc. or more than 160 kc. at 6 db down from resonance. The receiver will be more selective when measured from the antenna terminals.

INDEX TO PARTS MANUFACTURERS

Symbol	Manufacturer	Symbol	Manufacturer
AL	Alden Manufacturing Co. Brookton, Mass.	IC	Industrial Condenser Corp. Chicago, Illinois
AP	American Phenolic Corp. Chicago, Illinois	IRC	International Resistance Co. Philadelphia, Pennsylvania
CD	Cornell-Dubilier Corp. South Plainfield, N.J.	LF	Littlefuse Inc. Chicago, Illinois
CRL	Centralab Milwaukee, Wis.	O	Obmrite Manufacturing Co. Chicago, Illinois
CT	Chicago Telephone Supply Elkhart, Indiana	OM	Oak Manufacturing Co. Chicago, Illinois
ER	Erie Resistor Co. Erie, Pennsylvania	RCA	RCA Mfg. Co. Chicago, Illinois
GE	General Electric Co. Schenectady, N.Y.	SI	F. W. Sickles Co. Springfield, Mass.
H	The Hallcrafters Co. Chicago, Illinois	U	Utah Products Co. Chicago, Illinois
HR	Hart & Regman Hartford, Conn.		

Ref. Symbol	Name of Part and Description	Mfr Code and Type No.	Hallcrafters Part No.
T12	Transformer, power; plate; primary 230 volts, 50 cycles with tap for 115 volts; secondary 280 volts each side of center tap, 150 ma using 5W4G full wave rectifier and 10 mfd filter capacity; coil and core potted and sealed in metal case, 4-3/8" h x 3-21/32" wd x 3-21/32" d; 2 mtg flanges each having 3 mtg holes 7/32" diam spaced 1-3/8" apart, mtg centers 3-7/8" x 2-3/4".	H Special	52A043
TS1	Board, terminal; mounts three brass, cadmium plated binding posts and nuts, and has two brass cadmium plated mtg inserts; base of black BMT20 or 262 high impact bakelite; base 2-9/8" lg x 7/8" wd x 3/16" thk; mtg inserts centered on 3/4" x 1/2" mtg centers, have 0.144" clearance ID.	H Special	11B153
TS2	Board, terminal; mounts two brass, cadmium plated binding posts and nuts, and has two brass cadmium plated mtg inserts; base of black BMT20 or 262 high impact bakelite; base 1-5/8" lg x 7/8" wd x 3/16" thk; mtg inserts centered on 3/8" mtg centers have 0.144" clearance ID, same as TS3.	H Special	11B152
TS3	Same as TS2.	-	-
V1	Tube, detector amplifier pentode (acorn type); same as V2, V3.	RCA type 964	90X904
V2	Same as V1.	-	-
V3	Same as V1.	-	-
V4	Tube, television amplifier pentode, same as V6.	RCA type 6AC7	90X6AC7
V5	Tube, television amplifier pentode.	RCA type 6AB7	90X6AB7
V6	Tube, triple-grid super-control amplifier.	RCA type 6SK7	90X6SK7
V7	Tube, twin diode; same as V6.	RCA type 6RH	90X6RH
V8	Same as V4.	-	-
V9	Same as V2.	-	-
V10	Tube, twin-triode amplifier.	RCA type 6SL7GT	90X6SL7GT
V11	Tube, beam power amplifier.	RCA type 6V6 GT/G	90X6V6GT/G
V12	Tube, voltage regulator (Glow discharge type).	RCA type 603/VR-100	90XVR150
V13	Tube, full-wave high-vacuum rectifier.	RCA type 5W4G	90X5W4G
V14	Tube, detector, amplifier, oscillator (acorn type).	RCA type 905	90X905