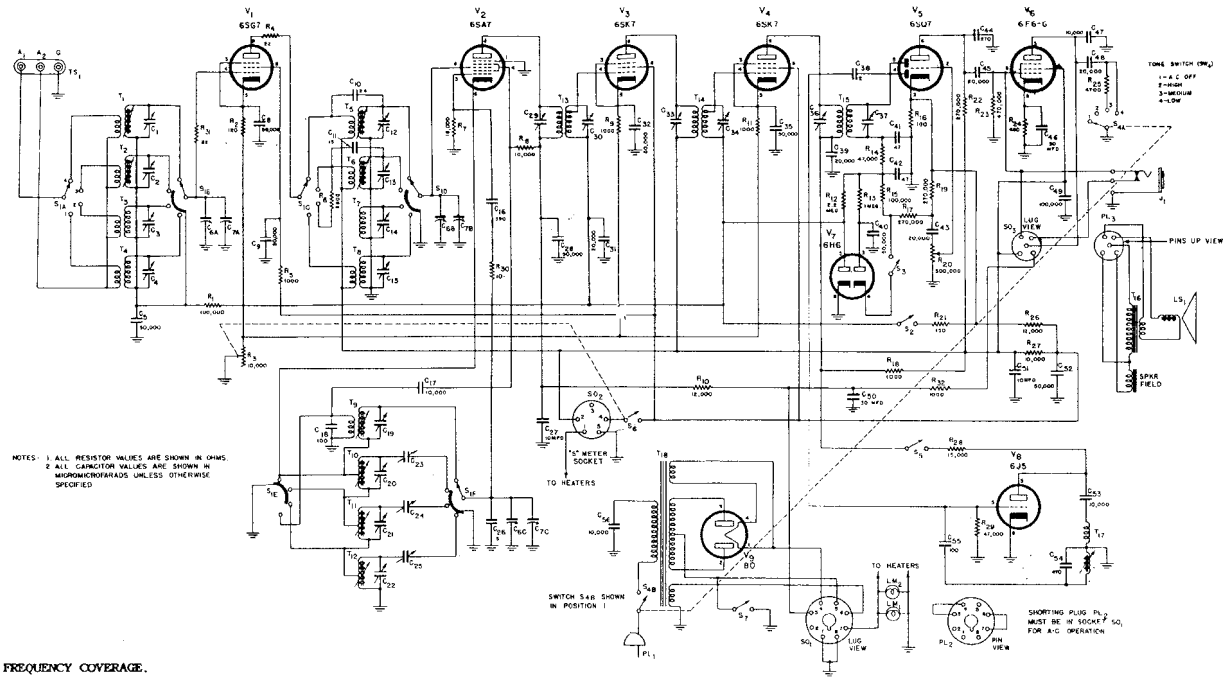

Figure 7-7 Radio Receiver Model S-40, schematic wiring diagram.

FREQUENCY COVERAGE.

The Model S-40 Radio Receiver provides continuous coverage over the frequency range from 550 kilocycles (kc) to 44 megacycles (mc) in four bands. Each band is provided with sufficient overlap to insure continuity of coverage over the entire tuning range. The frequencies covered per band are as follows:

Band	Coverage
1	550 kc. to 1700 kc.
2	1680 kc. to 5.4 mc.
3	5.3 mc. to 15.8 mc.
4	15.3 mc. to 44 mc.

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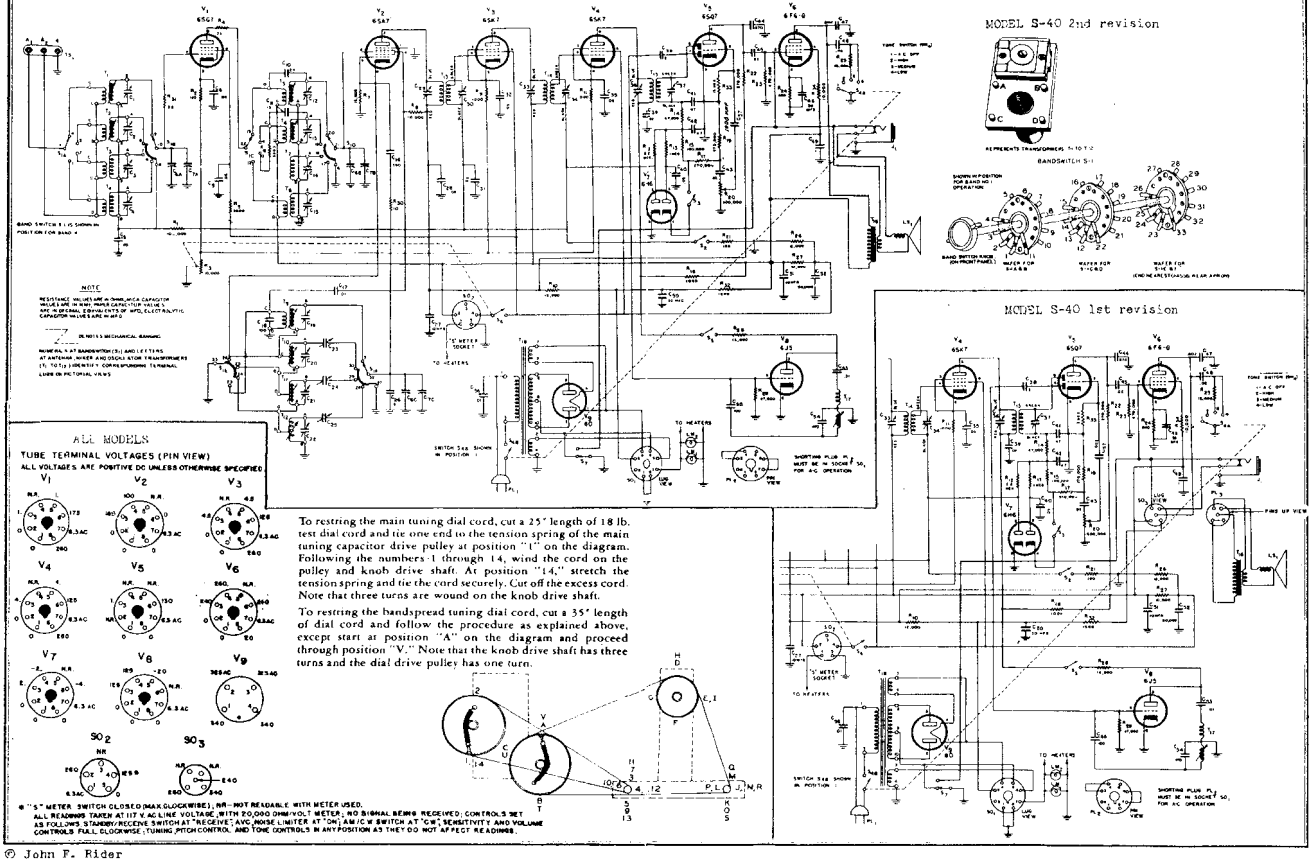

To restring the main tuning dial cord, cut a 25" length of 18 lb. test dial cord and tie one end to the tension spring of the main tuning capacitor drive pulley at position "1" on the diagram. Following the numbers 1 through 14, wind the cord on the pulley and knob drive shaft. At position "14," stretch the tension spring and tie the cord securely. Cut off the excess cord. Note that three turns are wound on the knob drive shaft.

To restring the bandspread tuning dial cord, cut a 35" length of dial cord and follow the procedure as explained above, except start at position "A" on the diagram and proceed through position "V." Note that the knob drive shaft has three turns and the dial drive pulley has one turn.

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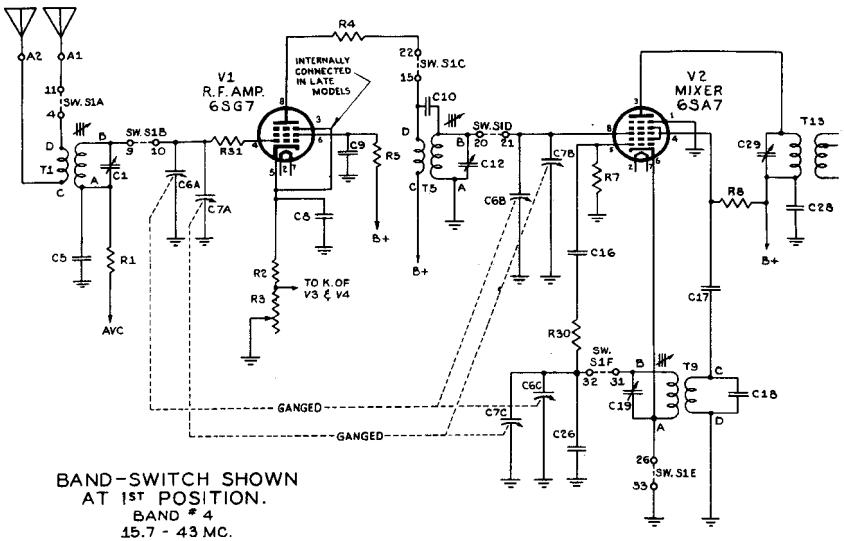
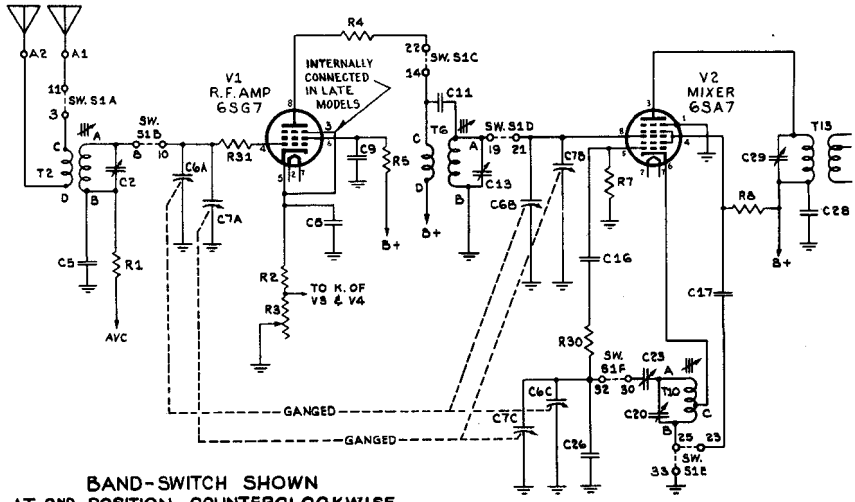


BAND-SWITCH SHOWN AT 1ST POSITION.
BAND # 4
15.7 - 43 MC.



BAND-SWITCH SHOWN AT 2ND POSITION COUNTERCLOCKWISE.
BAND #3
5.35 - 15.7 MC

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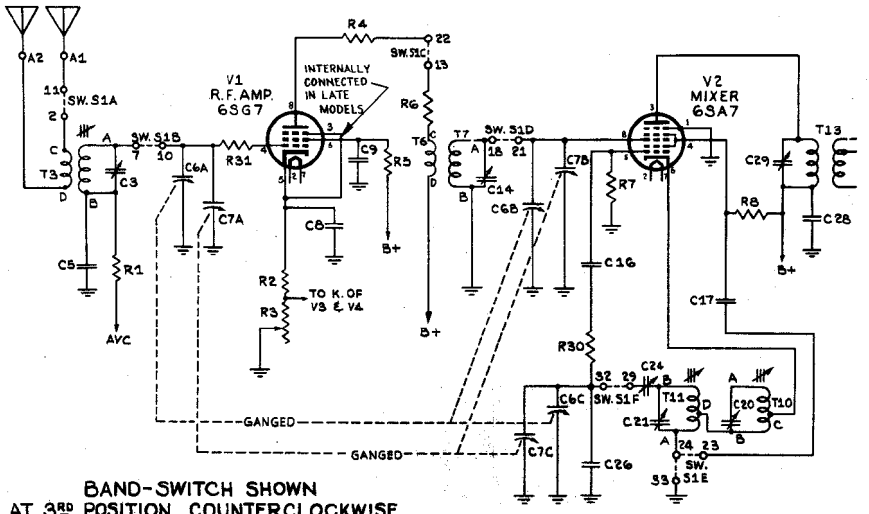
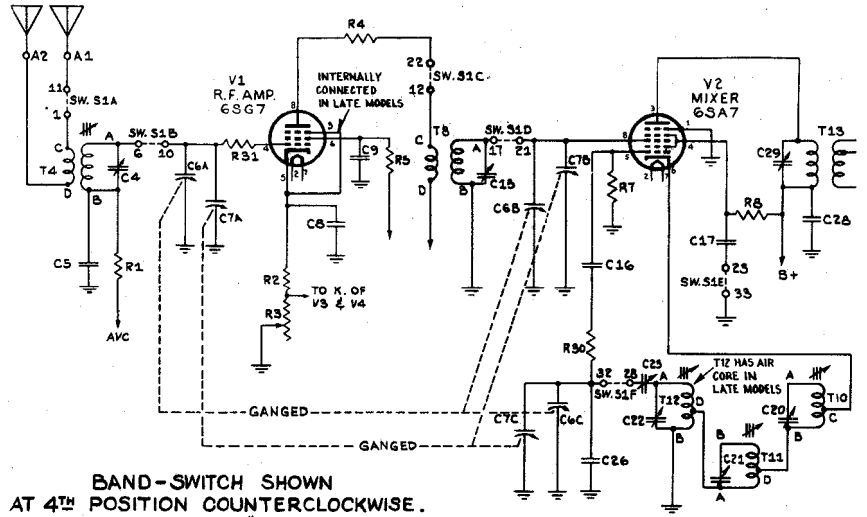


BAND-SWITCH SHOWN
AT 3RD POSITION COUNTERCLOCKWISE.
BAND # 2
1.7 - 5.35 MC.



BAND-SWITCH SHOWN
AT 4TH POSITION COUNTERCLOCKWISE.
BAND # 1
540 - 1700 KC.

POWER REQUIREMENTS.

The receiver is designed to operate from a 117-volt, 50/60 cycle single phase, (25/60 cycle if receiver has universal power transformer) a-c source or from a 6-volt storage battery and 260-volts of "B" battery. The "B" batteries may be replaced by a suitable vibrator type power supply if it meets the following current requirements:

A-C Operation	* D-C Operation
Line voltage . . . . . 117 volts	Filament voltage. . . . . 6.3 volts
Line current . . . . . 0.76 amp.	Filament current. . . . . 5 amps.
Power consumption. . . . . 75 watts	"B" voltage . . . . . 260 volts
	"B" current . . . . . 70 ma.

* The 6-volt battery drain using a vibrator type supply for "B" voltage will run approximately 10 amperes.

Audio Output Connections. - The headset jack marked PHONES, located on the front panel, provides output for headset reception. The circuit is such, that the speaker circuit is opened when the headset cord plug is inserted into the PHONE jack. The output of the first audio stage is then capacitively coupled to the PHONE jack.

Remote Operation Facilities. - The receiver may be disabled remotely by disconnecting the jumper wire between pins #3 and #4 on the shorting plug (PL-2), which is normally plugged into socket SO-1 during a-c operation, and connecting a remote switch or relay across these pins. The stand-by switch is connected in the "B" lead. When using the remote control disabling switch, the STANDBY/RECEIVE switch on the receiver must be set at STANDBY.

PREPARATION FOR USE.

A-C Operation. - The receiver may be operated from a 117-volt, 50/60 cycle, (25/60 cycle if universal power transformer is used) single phase a-c source of power. In the event that the receiver has a universal power transformer, check the line voltage and set the line voltage switch, located on top of the transformer, before connecting the receiver to a source of power. If the receiver power transformer is set for a higher line voltage than the source, it will not be damaged when connected to a line of lower voltage, but a receiver set for a lower line voltage will, in most cases, be damaged when plugged into an outlet having a higher line voltage.

D-C Operation. - The receiver may be operated from a 6-volt d-c source, generally a storage battery, and a 260-volt d-c supply in the form of dry batteries or vibrator type power pack. Consult the chart on power requirements for d-c operation in Section I, and provide battery facilities capable of supplying these demands. The receiver is connected to the d-c supply as follows:

(1) Remove the octal "jumper plug" (PL-2) used for a-c operation from socket SO-1. Use #18 (AWG) wire leads for the 260-volt "B" supply connections to pins #3 and #5, and #12 (AWG) wire leads for the 6-volt "A" battery connections to pins #1, #8 and #7.

CAUTION - Check your wiring carefully before connecting up to the battery supply.

OPERATION.

Listed below are the receiver controls and their settings for the two types of reception provided by this receiver, namely, phone and c-w code reception. Refer to Figure 1-1 or the front panel of the receiver.

a. PHONE RECEPTION. - To receive phone signals set the front panel controls as follows:

STANDBY/RECEIVE switch	- Set at RECEIVE. (Set at STANDBY to disable receiver for short standby periods.
BAND SELECTOR switch	- Set at range number corresponding to band covering desired frequency.
AM-CW switch	- Set at AM.
A.V.C. switch	- Set at ON.
NOISE LIMITER switch	- Normally set at OFF.

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SENSITIVITY control	- Turn the control all the way clockwise to maximum.
VOLUME control	- Adjust for desired volume at headset or loudspeaker.
PITCH CONTROL	- Not used.
TONE control	- Set to please listener. Set at HIGH for normal reception. Generally set at LOW or MED. when noise level is high.
TUNING control	- Set calibrated dial to frequency of desired signal and adjust for maximum tuning meter deflection (if a tuning meter is used.) Dial frequency calibrations are true only with BAND-SPREAD tuning dial set at zero.
BANDSPREAD Tuning control	- Use this control in conjunction with the TUNING control as described in the paragraph on bandspread tuning in this section. This control is used for finer tuning.

b. **C-W Code Reception.** - To receive continuous wave (c-w) code signals, set the front panel controls as follows:

BAND SELECTOR switch	- Set at range number corresponding to band covering desired frequency.
A.V.C. switch	- Set at OFF.
AM-CW switch	- Set at CW.
NOISE LIMITER switch	- Set at OFF.
TUNING control	- Set calibrated dial at frequency of desired signal. Tune for maximum signal level at headset or loudspeaker. Dial frequency calibrations are true only with the BANDSPREAD tuning dial set at zero.
SENSITIVITY control	- Turn up as high as the signal strength of the code signal will permit. Too much gain will result in distortion of the signal.
TONE control	- Set at LOW or MED.
VOLUME control	- Turn up to full clockwise.
BANDSPREAD tuning control	- Use this control in conjunction with the MAIN tuning control as described in the paragraph in bandspread tuning in this section. This control is used for finer tuning.
PITCH CONTROL	- Set at desired pitch of code signal by turning to the right or left.
STANDBY-RECEIVE	- Set at RECEIVE (Set at STANDBY to disable receiver for short standby periods.

GENERAL: Model S-40 is a 9 tube commercial superheterodyne table model, radio receiver, incorporating 4 bands of AM/CW reception, as follows: band #1, 540 kc to 1700 kc; band #2, 1.7 mc to 5.35 mc; band #3, 5.35 mc to 15.7 mc; band #4, 15.7 mc to 43 mc. Provision for variable sensitivity control; optional AVC, noise limiting, BFO pitch, tone, headset reception, and use of an external "S" meter; standby operation; and bandspreading are provided.

REAR PANEL CONNECTIONS: Consist of AC line cord with plug, antenna and ground connector strip, dc power input socket and external "S" meter connector socket.

POWER SUPPLY DATA: AC operation—117 volt, 50/60 single phase source. (Also, 110/130/150/220/250 volt, 25 cycles single phase source with special power transformer available, Hallicrafter's part #52CO27.) Power drain is 75 watts.

DC operation—filament 6.3 volt @ 3.5 amp; "B" supply 260 volt @ 70 ma. (The 6 volt battery drain for vibrator type supply for "B" voltage will run about 10 amp.)

FUNCTIONING OF PARTS

1. GENERAL.

Figure 4-1. shows, in a very simple block form, the plan of the circuit of the Model S-40 radio receiver. Note that the circuit is that of the conventional superheterodyne receiver. A signal received at the antenna is fed through an r-f amplifier stage to a combined mixer-oscillator stage where a local signal is generated and mixed with the incoming signal. An intermediate frequency signal selected at the output of the mixer stage is fed through two i-f amplifier stages to a combined detector audio amplifier stage where it is demodulated, amplified and fed through an audio power amplifier stage to a loud speaker. Provision is made for headset reception. A combined a-v-c and a-n-l stage is also included to provide improved reception. A beat frequency oscillator is incorporated for the reception of continuous wave (c-w) signals. Provision is also made for bandspread operation. An external tuning meter may be used with the receiver, provision being made at the rear of the receiver for connections.

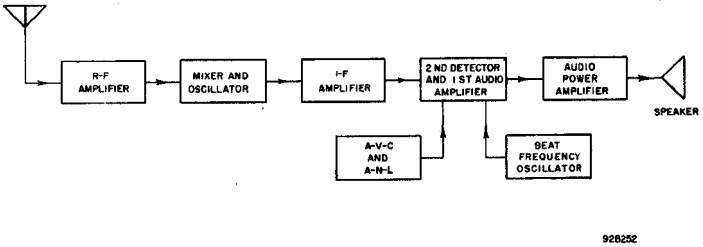

Figure 4-1. Radio Receiver Model S-40, block diagram.

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

Since the circuit functions of bands 1, 2, 3 and 4 are essentially identical, this discussion will describe the circuit with BAND SELECTOR switch (S-1A through S-1F) set at band 4 as shown in the schematic diagram.

a. R.F. Amplifier. - The r-f amplifier stage employs a type 6BG7 pentode tube in a conventional class A amplifier circuit. Signals present at the antenna are fed to the primary of transformer T-1 through terminals A-1 and A-2 of the antenna terminal strip TS-1. The secondary of transformer T-1 is tuned by the ganged tuning capacitor section C-6A and trimmer C-1. Ganged tuning capacitor section C-7A acts as a bandspread for the secondary of transformer T-1. 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-5. Resistor R-1 and capacitor C-5 provide decoupling for the a-v-c voltage applied to the control grid. Parasitic resistors R-4 and R-31 prevents unwanted oscillations in this stage and tends to stabilize the amplifier. Resistor R-2, by-passed by capacitor C-8, provides self-bias for the stage. Resistor R-3 (SENSITIVITY control) regulates the bias to the grid. Resistor R-5 and capacitor C-9 act as a decoupling network for the screen of tube V-1. The signal voltage developed across the primary of transformer T-5 is then coupled to the grid of tube V-2 inductively through transformer T-5 and capacitively through capacitor C-10. Capacitor C-10 provides a small amount of coupling to improve the response at the high frequency end of the band, thus equalizing the r-f signal amplitude over the tunable frequency range.

b. Mixer-Oscillator. - The mixer-oscillator stage employs a type 6BA7 converter tube. The tube functions both as oscillator and mixer. The secondary of r-f transformer T-5 is tuned by section C-6B of the ganged tuning capacitor and trimmer C-12. Ganged tuning capacitor section C-7B acts as bandspread tuning for the secondary of transformer T-5. Ganged tuning capacitor section C-6C, trimmed by capacitor C-19, tunes the secondary of transformer T-9 which is part of the oscillator circuit. Ganged tuning capacitor section C-7C acts as bandspread tuning for the secondary of transformer T-9. A signal generated by the local oscillator, 455 kc. higher in frequency than the received signal on bands #1, #2, #3 and 455 kc. lower in frequency than the received signal on band #4, is mixed electronically in the mixer tube since the oscillator tube elements are included as part of the mixer tube V-2 in the same tube envelope. The frequency of oscillation is determined by a resonant circuit consisting of the secondary of transformer T-9 and section C-6C of the main tuning capacitor and trimmer capacitor C-19 connected in parallel. Section C-7C of the variable ganged bandspread capacitor is connected in parallel with section 6-6C of the main tuning capacitor for the purpose of effectively spreading or broadening the frequency range. Capacitor C-26 is an additional fixed trimmer across the resonant circuit. Capacitor C-18 provides increased gain for the oscillator on this band. Variable capacitors C-23, C-24, and C-25 are padders for bands #3, #2, and #1 respectively. Resistor R-7 is a grid return for the oscillator grid in tube V-2. Capacitor C-16 is the oscillator grid coupling capacitor while capacitor C-17 provides coupling and d-c blocking for the oscillator plate circuit. Resistor R-30 suppresses parasitic oscillations. Plate voltage for the screen grid of tube V-2, which also acts as oscillator plate, is applied through resistor R-8. The difference frequency of the oscillator and incoming signal frequencies is applied to the first i-f transformer T-13 primary which is tuned by capacitor C-29. Capacitor C-29 is a by-pass for the mixer plate.

c. First and 2nd I-F Amplifier. - The first and 2nd i-f amplifier stages employ type 6SK7 pentode tubes. I-f amplifier coupling transformer T-13, T-14, and T-15 for these two stages are tuned to 455 kc by adjusting the trimmer capacitors across each transformer primary and secondary. The gain of the 1st and 2nd i-f amplifier stages is varied by the SENSITIVITY control (R-3), connected in series with the cathodes of both tubes, to provide sensitivity control for the receiver. The a-v-c grid voltage is applied to this section of the receiver through resistor R-12 when A.V.C. switch S-2 is at OFFor in the open position. C-31 is an a-v-c by-pass for the control grid of 1st i-f amplifier tube V-3. Resistor R-9, by-passed by capacitor C-32, provides fixed bias for tube V-3. Resistor R-11 by-passed by capacitor C-35 provides fixed bias for 2nd i-f amplifier tube V-4. Capacitor C-39 is a plate by-pass for tube V-4. The signal voltage developed across the transformer T-15 primary is fed inductively to the 2nd detector.

d. 2nd Detector and 1st Audio. - Both the second detector and first audio amplifier stages employ a single type 6BQ7 duo diode-triode. The diode section of tube V-5 serves as a detector by rectifying the modulated carrier. The r-f filter for this type of detection consists of resistor R-14 and capacitors C-41 and C-42 connected in a pi-section. Automatic volume control and audio frequency voltage is obtained from a voltage divider consisting of resistors R-19, R-17 and R-15. Capacitor C-43 couples the 2nd detector to the VOLUME control, resistor (R-20). Resistor R-16 is bias for the first audio stage, part of tube V-5. Resistor R-22 is the plate load for the triode part of tube V-5. Capacitor C-44 acts as r-f filter at the plate. The audio frequency voltage is then fed through coupling capacitor C-45 to the grid of the output audio amplifier tube V-6.

e. Power Audio Amplifier. - The power audio amplifier stage is a class A amplifier employing a type 6F6-G pentode. Resistor R-23 is a grid return for the control grid of tube V-6. Resistor R-24, by-passed by capacitor C-46, supplies bias to the control grid. Resistor R-25 and capacitors C-47 and C-48 serve as a tone control circuit. Capacitor C-49 serves as by-pass for the screen grid. The audio signal is then fed through socket SO-3 and plug PL-3 to the primary of output transformer T-16 whence it is coupled inductively to the secondary and fed to the speaker LS-1 voice coil. An audio frequency signal is also fed from the grid of tube V-6 to PHONE jack J-1. Voltage is fed to the plate of tube V-6 through the primary of transformer T-16.

f. A.V.C. and NOISE LIMITER. - Both the automatic volume control and automatic noise limiter stages employ a single type 6H6 duo-diode. One diode of tube V-7 serves as the automatic volume control rectifier. The remaining diode section of tube V-7 serves as an automatic limiter as follows: Capacitor C-40 becomes charged by the rectified carrier voltage and the time constant of this capacitor and 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-40 becomes more negatively charged than the charge held by capacitor

C-40 until the cathode voltage of the a-n-1 diode again reaches a less negative potential than its plate and capacitor C-40 acquires its normal charge. By shorting the audio voltage to ground during a noise pulse, the a-n-1 circuit prevents the objectionable noise pulses from reaching the audio amplifier stages.

g. **Beat Frequency Oscillator.** - The beat frequency oscillator employs a type 6J5 triode tube in a tuned-grid, untuned plate oscillator circuit. The oscillator frequency is adjusted by a moveable powdered iron core in the field of transformer T-17. This iron core adjustment sets the oscillator frequency at 455 kc. and is adjusted by a screw driver during alignment. The fine adjustment of the oscillator frequency required to provide control of the beat note frequency is controlled by a knob (PITCH CONTROL) from the front panel. The AM-CW switch controls the use of the oscillator by opening or closing the plate voltage lead to the tube. Resistor R-28 provides a load for the plate of tube V-8. Resistor R-29 is the oscillator tube V-8 grid return while capacitor C-55 provides grid coupling from the oscillator tank circuit. Capacitor C-54, across part of transformer T-17, resonates the tank circuit. Capacitor C-53 forms part of a series impedance circuit with part of transformer T-17. The beat frequency signal is coupled to the 2nd detector through capacitor C-38.

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

(1) **A-C Operation.** - The receiver's power supply provides for operation from a 117-volt source. The a-c current is fed to the primary of power transformer T-18 through the line cord. A type 80 (tube V-9) full wave rectifier is employed in a conventional full wave rectifier circuit. The high voltage from this rectifier is fed to a 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 STANDBY/RECEIVE switch is connected in series with the transformer T-18 center tap lead to ground (chassis), thereby disabling the receiver but at the same time keeping the tube heaters hot and ready for instant use. The filter circuit consists of a pi network made up of the speaker field coil and capacitors C-50 and C-51. Resistors R-26 and R-27 are part of a voltage divider and capacitor C-52 is a by-pass.

(2) **D-C Operation.** - External 6-volt storage battery and 260-volts of "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 fed to the input side of the filter sections used for a-c operation thereby insuring adequate filtering for vibrator type power supplies.

i. **Tuning Meter.** - The tuning meter "S METER" is not supplied with the receiver, but can be purchased on request from the company. Provision has been made on the rear apron of the receiver for the external connection of the "S" meter. A five prong plug is wired to the meter as indicated in figure 4-2 and should be plugged into socket SO-2. When metering reception, the meter measures a voltage drop across resistor R-27 e.i. a change in screen current of first and second i-f amplifier tubes V-4 and V-3.

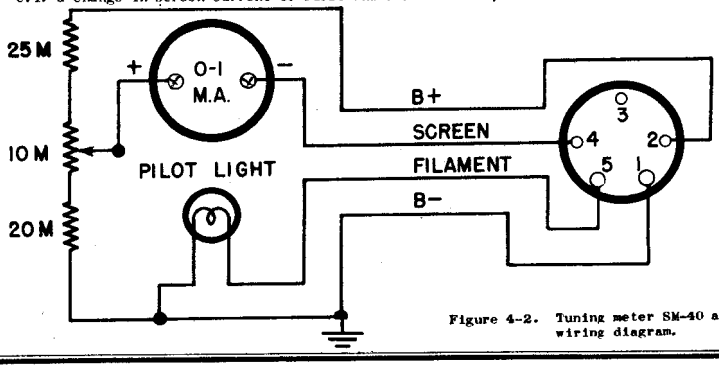

Figure 4-2. Tuning meter SM-40 and schematic wiring diagram.

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MAINTENANCE

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 CHART before attempting to service circuits that are "hot". IT IS 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. The time interval between inspections will be determined by the operating conditions of the individual installation. In general, 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 capacitors. Dust should be blown out with dry air or brushed out carefully without bending the gang plates in the slightest. Noisey 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 are accessible at the top of the chassis through the hinged cover of the cabinet. When replacing tubes, check the tube type carefully and replace with the correct 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 employes two lamps with bayonet type sockets to illuminate the calibrated tuning dial and the bandspread tuning dial. The lamps are to be replaced with a 6/8-volt, 250 ma. (blue bead) G.E. #44 or equivalent. The color code referred to, is the color of the glass bead above the glass stem inside the envelope of the lamps.

3. PERIODIC ADJUSTMENTS.

a. **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 amplifier 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 amplifier stages. Alignment should not be attempted by inexperienced persons 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 455 kc, and 550 kc. to 44 mc. range.

(b) A 390 ± 20% ohm non-inductive carbon dummy antenna resistor.

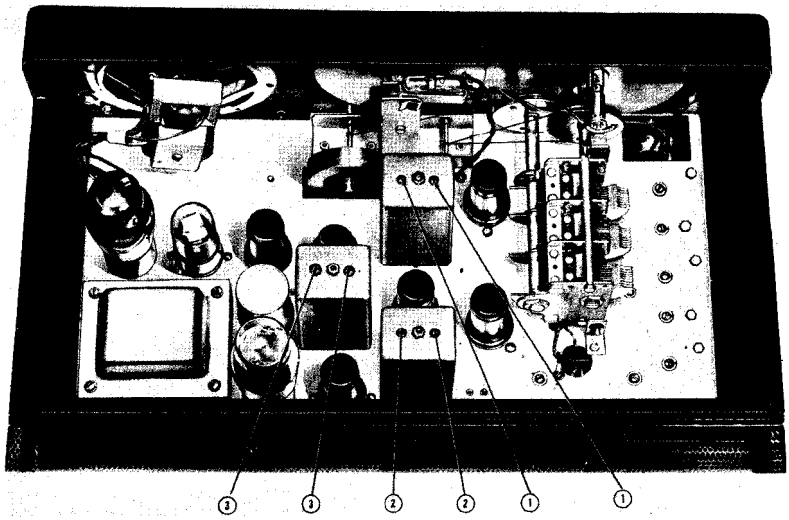
(c) Non-metallic screw driver. A bakelite screw driver with a short metal blade is very good.

(d) Audio output meter capable of handling 1.5 watts of audio power for speaker load.

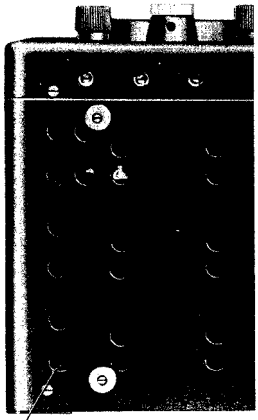
(2) I-F Amplifier Alignment. - (See Fig. 5-1)

(a) Connect the "hot" lead of the generator directly to the stator plates of the center section of the main tuning capacitor gang (the solder lug on top of that section). Connect the ground wire of the generator to the receiver chassis. Set main tuning capacitor at minimum capacity (open).

(b) Connect the output meter across the speaker voice coil and set the meter range switch for its highest range to prevent overloading the meter accidentally.



① I-F Adjustments for 1st I-F Transformer T-13
② I-F Adjustments for 2nd I-F Transformer T-14
③ I-F Adjustments for 3rd I-F Transformer T-15



R-F and oscillator adjustment holes

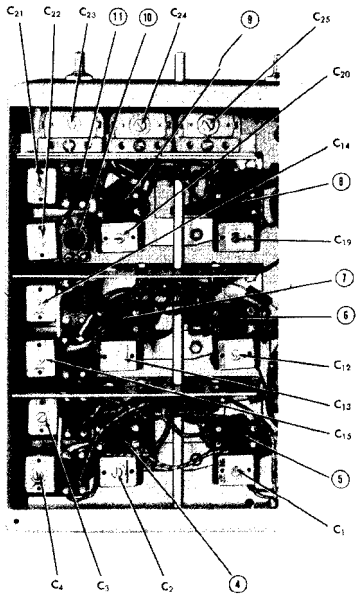


Figure 5-1. Radio Receiver Model S-40, view showing aligning points.

(c) Let the receiver warm up for approximately ten minutes, then set the receiver controls as follows:

SENSITIVITY control at maximum sensitivity (full clockwise).
VOLUME control at maximum volume (full clockwise).
A.V.C. switch at OFF.
NOISE LIMITER switch at OFF.
CW-AM switch at AM.
TONE control at HIGH.
STANDBY/RECEIVE switch at RECEIVE.

(d) Set the signal generator frequency at 455 kc, and turn on the 400-cycle modulation.

(e) Adjust transformers T-13, T-14, and T-15 for maximum output meter reading using just enough signal generator output to provide a good resonant swing on the output meter. The signal level at the generator should be approximately 52 microvolts for a 500 milliwatt audio output level. Repeat the alignment procedure until assured of accurate alignment. Refer to figure 5-1 for the location of i-f transformer adjustment screws #1 through #3 inclusive on transformers T-13, T-14, and T-15.

(3) Beat Frequency Oscillator Adjustment. -

Connect signal generator as in paragraph (2). Turn 400-cycle modulation off. Remove PITCH CONTROL knob with an Allen wrench and adjust the slotted screw shaft for zero beat. Replace knob so that red mark is on top.

(4) R-F Amplifier Alignment. -

†See note at end of this section.

(a) Connect the "hot" lead of the signal generator to terminal "A1" of the antenna terminal board through a 390 ± 20% ohm non-inductive carbon resistor. Connect the ground lead of the generator to the receiver chassis. Leave the jumper connected between terminals "A2" and "GND". Turn on the 400-cycle modulation.

(b) Let the receiver warm up for approximately ten minutes, then set the receiver controls as follows:

SENSITIVITY control at maximum sensitivity (full clockwise).
VOLUME control at maximum volume (full clockwise).
A.V.C. switch at OFF.
NOISE LIMITER switch at OFF.
CW-AM switch at AM.
TONE control at HIGH.
STANDBY/RECEIVE switch at RECEIVE.

NOTE - For all alignment adjustments, the signal generator output attenuator must be adjusted to provide a 500 milliwatt audio signal output at the speaker socket of the receiver on the output meter.

NOTE - Refer to figure 5-1 for all r-f alignment points.

(c) Band 4. Alignment. -

(1) Set the signal generator at 36 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 36 mc. no adjustment is necessary - if not, adjust oscillator trimmer capacitor C-19 for maximum output with the receiver dial set at 36 mc.

(2) Set the signal generator at 18 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 18 mc. no adjustment is necessary - if not, adjust slug #8 on transformer T-9 for maximum output with the receiver dial set at 18 mc.

NOTE - If slug #8 has been adjusted it will be necessary to repeat step (1) again. Several adjustments of capacitor C-19 in step (1) and slug #8 in step (2) may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

(3) Set signal generator and receiver at 36 mc. and adjust trimmers C-1 and C-12 for maximum output.

(4) Set signal generator and receiver at 18 mc. and adjust slugs #5 and #6 for maximum output.

NOTE - If slugs #5 and #6 have been adjusted, it will be necessary to repeat step (3) again. Several adjustments of capacitors C-1 and C-12 and slugs #5 and #6 may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

(d) Band 3. Alignment. -

(1) Set the signal generator at 14 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 14 mc. no adjustment is necessary - if not, adjust oscillator trimmer capacitor C-20 for maximum output with the receiver dial set at 14 mc.

(2) Set the signal generator at 7 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 7 mc. no adjustment is necessary - if not, adjust oscillator padder capacitor C-23 for maximum output with the receiver dial set at 7 mc.

NOTE - If capacitor C-20 has been adjusted it will be necessary to repeat step (1) again. Several adjustments of capacitor C-20 in step (1) and capacitor C-23 in step (2) may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

(3) Set the signal generator at 10 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 10 mc. no adjustment is necessary - if not, adjust slug #9 on transformer T-10 for maximum output with the receiver dial set at 10 mc.

(4). If slug #9 has been adjusted, repeat steps (1) and (2).

(5) Set the signal generator and receiver at 14 mc. and adjust trimmers C-2 and C-13 for maximum output.

(6) Set signal generator and receiver at 7 mc. and adjust slugs #4 and #7 for maximum output.

NOTE - If slugs #4 and #7 have been adjusted, it will be necessary to repeat step (3) again. Several adjustments of capacitors C-2 and C-13 and slugs #4 and #7 may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

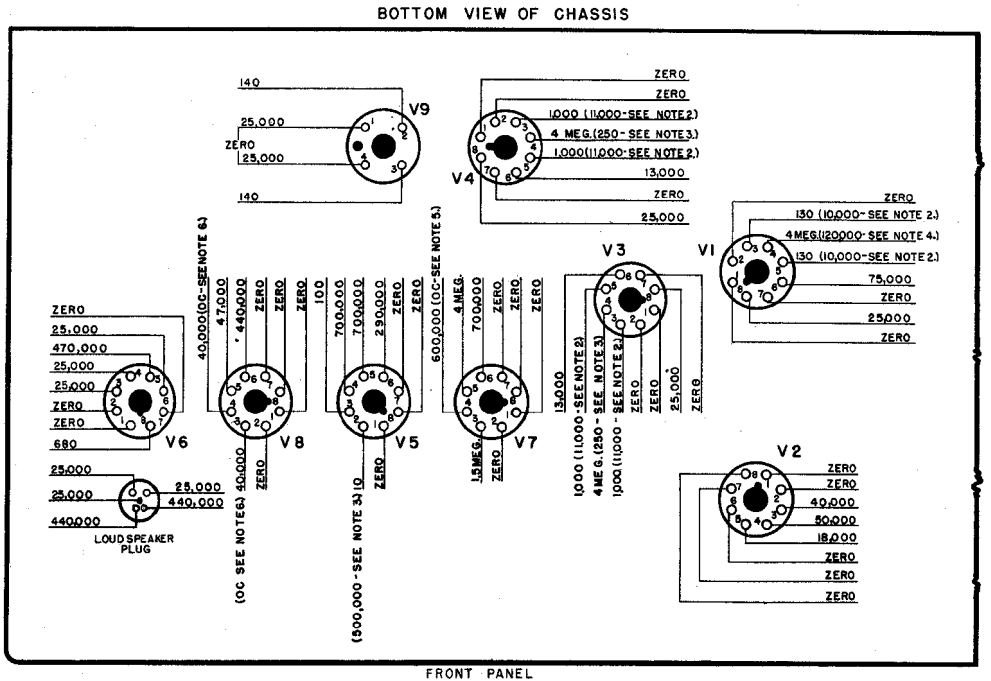
(e) Band 2. Alignment. -

(1) Set the signal generator at 5 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 5 mc. no adjustment is necessary - if not, adjust oscillator trimmer capacitor C-21 for maximum output.

(2) Set the signal generator at 1.8 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 1.8 mc. no adjustment is necessary - if not, adjust oscillator padder capacitor C-24 for maximum output with the receiver dial set at 1.8 mc.

NOTE - If capacitor C-21 has been adjusted it will be necessary to repeat step (1) again. Several adjustments of capacitor C-21 in step (1) and capacitor C-24 in step (2) may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

(3) Set the signal generator at 3 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 3 mc. no adjustment is necessary - if not, adjust slug #11 on transformer T-11 for maximum output with the receiver dial set at 3 mc.



NOTES:
1. CIRCUIT RESISTANCES LESS THAN ONE OHM ARE SHOWN AS "ZERO".
2. RESISTANCE READING WITH "SENSITIVITY" CONTROL SET AT MINIMUM SENSITIVITY.
3. RESISTANCE READING WITH "VOLUME" CONTROL SET AT MINIMUM VOLUME.
4. RESISTANCE READING WITH "A.V.C." SWITCH SET AT "OFF."
5. RESISTANCE READING WITH "NOISE LIMITER" SWITCH SET AT "OFF."
6. RESISTANCE READING WITH "CW-AM" SWITCH SET AT "AM."
7. OC = OPEN CIRCUIT.

Figure 5-3. Radio Receiver Model S-40, resistance chart.

(4) If slug #11 has been adjusted repeat steps (1) and (2).

(5) Set the signal generator and receiver at 5 mc. and adjust trimmers C-3 and C-14 for maximum output.

(f) Band 1. Alignment. -

(1) Set the signal generator at 1500 mc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 1500 kc. no adjustment is necessary - if not, adjust oscillator trimmer capacitor C-22 for maximum output with the receiver dial set at 1500 kc.

(2) Set the signal generator at 600 kc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 600 kc. no adjustment is necessary - if not, adjust oscillator padder capacitor C-25 for maximum output with the receiver dial set at 600 kc.

NOTE - If capacitor C-22 has been adjusted it will be necessary to repeat step (1) again. Several adjustments of capacitor C-22 in step (1) and capacitor C-25 in step (2) may be required in cases where the transformer has been greatly detuned or a new transformer has been installed.

(3) Set the signal generator and receiver at 1000 kc. and tune in its signal on the receiver. If the receiver's calibrated dial reads 1000 kc. no adjustment is necessary - if not, adjust slug #10 on transformer T-12 for maximum output with the receiver dial set at 1000 kc.

(4) If slug #10 has been adjusted repeat steps (1) and (2).

(5) Set the signal generator and receiver at 1500 kc. and adjust trimmers C-4 and C-15 for maximum output.

NOTE - After completing the above r-f alignment procedure check the image frequency to determine whether the oscillator frequency is higher than the signal frequency on bands 1, 2 and 3, and lower than the signal frequency on band 4.

(g) When completely aligned the overall receiver sensitivity will usually run from 7.2 microvolts at 600 kc. to 5 microvolts at 36 mc. for 500 milliwatts audio output. If your receiver falls reasonably close to this sensitivity, consider your job finished.

4. LOCATING FAULTS WITH A VOLT-OHM METER.

a. Voltage Chart. Refer to schematic for the tube socket terminal voltages. Voltages shown are those between the terminal and ground (chassis) unless otherwise specified. The readings were taken with a Weston Model 772 Analyzer using 20,000 ohm per volt sensitivity. To prepare the receiver for measurement, disconnect the antenna, connect a jumper between the antenna terminals A1, A2, and G, and set the controls as follows:

STANDBY/RECEIVE switch at RECEIVE.
A.V.C., NOISE LIMITER at ON and AM-CW switch at CW.
SENSITIVITY and VOLUME controls full clockwise.
TUNING, and PITCH CONTROL adjustments do not effect the reading.
TONE control at any one of the three tone positions.

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 a Weston Model 772 Analyzer. To prepare the receiver for measurement, disconnect the a-c line cord and set the controls as follows:

STANDBY/RECEIVE switch at RECEIVE.
A.V.C., NOISE LIMITER at ON and AM-CW switch at CW.
SENSITIVITY and VOLUME controls full clockwise position.
TONE control at any one of the three tone positions.
TUNING and PITCH control adjustments do not effect the readings.

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 resistance instead of winding resistance alone as indicated in the chart.

Circuit Symbol	Name of Part	Winding	Winding Terminals	D-C Resistance (Ohms)
T-16	TRANSFORMER, audio	Primary	Primary	400
		Secondary	Secondary	* 5
SPKR FIELD	Speaker field	-	-	1500
T-18	TRANSFORMER, power	Primary	1 to 3	6
		H.V. secondary	6 to 10	280
		½ H.V. secondary	6 to 8	140
			8 to 10	140
		6.3-volt secondary	2 to 4	ZERO
		5.0-volt secondary	7 to 9	ZERO

* With speaker plug in socket.

†Note Rock main tuning gang capacitor when making r-f adjustments on bands 3 and 4.

TUBE COMPLEMENT.

Symbol	Tube Type	Function
V-1	6SG7	R-F amplifier
V-2	6SA7	Mixer and local oscillator.
V-3	6SK7	1st i-f amplifier
V-4	6SK7	2nd i-f amplifier
V-5	6SQ7	Detector, 1st audio amplifier
V-6	6F6-G	Audio power amplifier
V-7	6H6	A-V-C and noise limiter
V-8	6J5	Beat frequency oscillator
V-9	80	Rectifier

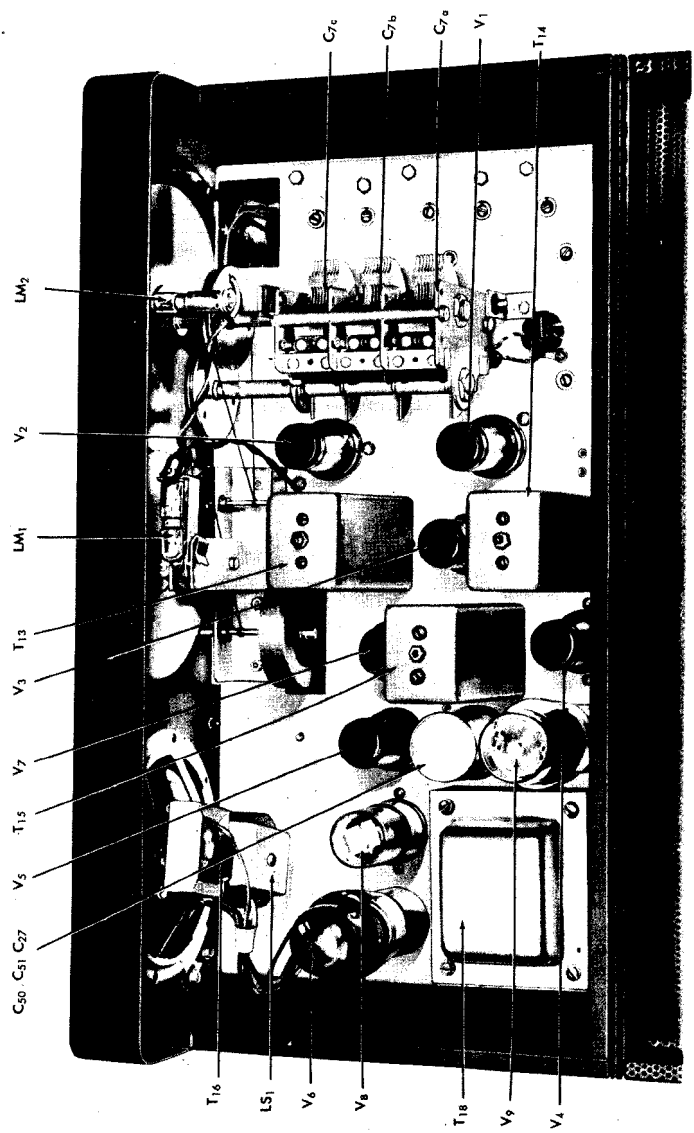


Figure 7-1. Radio Receiver Model S-40, top view.

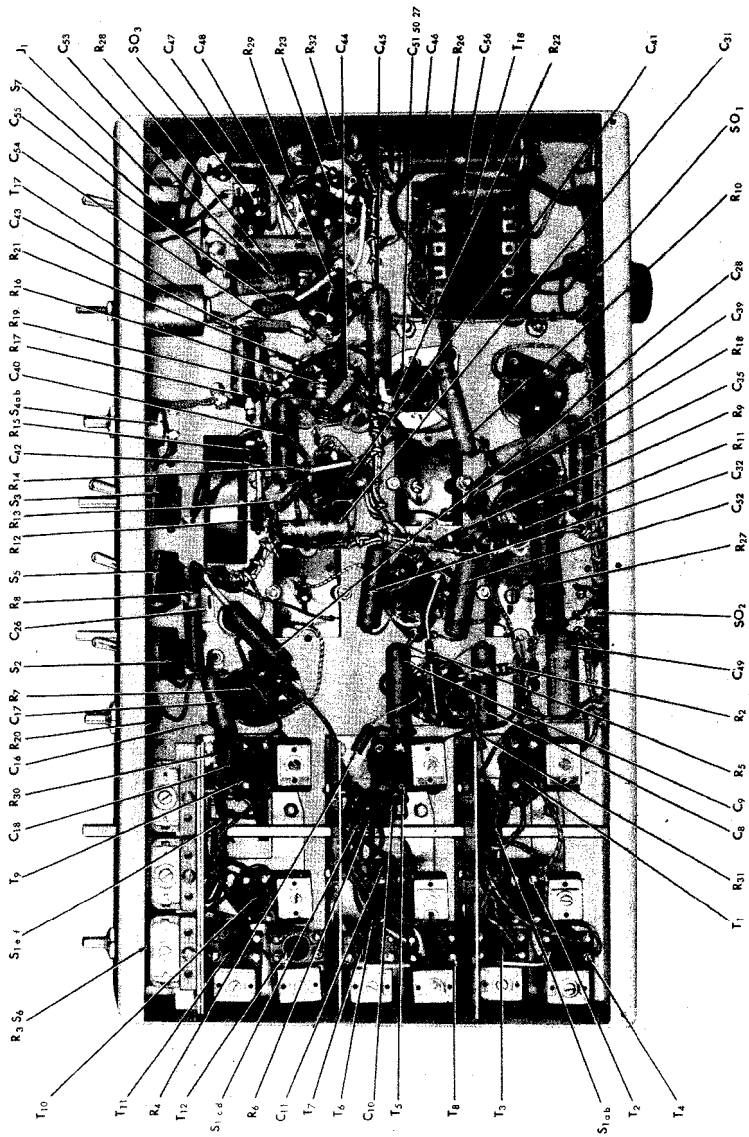


Figure 7-2. Radio Receiver Model S-40, bottom view.

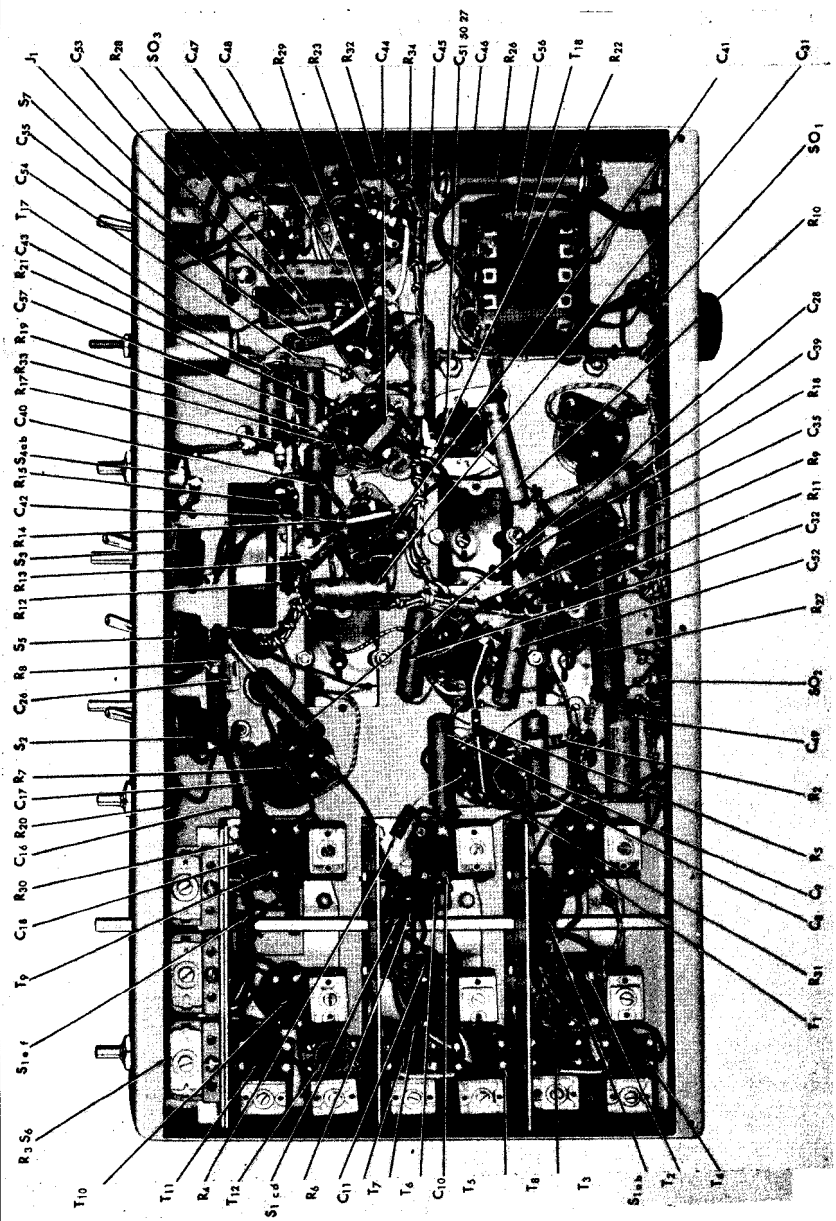


Fig. 3. Bottom view of the receiver showing components location.

MODEL S-40

THE HALLICRAFTERS CO.

IF FREQUENCY	IF SELECTIVITY	IMAGE RATIO	SENSITIVITY	AUDIO OUTPUT
455 kc	6.8 kc wide at 6 db down 40.7 kc wide at 60 db down (for 500 milliwatt output)	6:1 at 30 mc 15:1 at 14 mc 37:1 at 5 mc 1000:1 at 1500 kc	15 microvolt for 500 milliwatt output at 550 kc 8 microvolt for 500 milliwatt output at 40 mc	1 watt with less than 10% distortion

CONTROL SETTINGS FOR PRELIMINARY TEST OPERATION (Broadcast Band)

REF. NO. (in Fig. 1)	NAME	FUNCTION	SETTING
1	SENSITIVITY	RF gain control	Maximum clockwise
2	BAND SELECTOR	Operating band selector	Counter clockwise to "1"
3	VOLUME	Audio gain control	Half clockwise; adj. as necessary
4	AVC	Automatic volume control	AT "ON"
5	TUNING	Main tuning control	To local station freq. on main dial scale
6	CW/AM	BFO on/off switch	At "AM"
7	NOISE LIMITER	Noise peak limiting	At "OFF"
8	BAND SPREAD	Short wave band spreading	To "O" on small dial scale
9	TONE	Receiver on/off switch and tone control	Clockwise to "MED"
10	PITCH CONTROL	CW beat note pitch selector	Any position (not in use)
11	PHONES jack	Headset connection	Not used
12	STANDBY RECEIVE	Receiver temporary standby	At "RECEIVE"

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER	COMPONENT LIST PRICE
	CAPACITORS		
C-1, 7, 12, 13 and 19	4 to 80 mmf trimmer for transformers T-1, T-2, T-5, T-6 and T-9.	44A149	$ .10
C-3, 4, 14, 15, 20 21 and 22	1.5 to 15 mmf trimmer for transformers T-3, T-4, T-7, T-8, T-10, T-11 and T-12	44A147	.10
C-5	0.05 mfd; +40 −20%; 300 vdcw; paper.	46A091	.20
C-6 and 7	Tuning capacitor; 3 sections ganged.	48C138	3.75
C-8, 10, 35 and 40	0.05 mfd; +40 −10%; 200 vdcw; paper.	46AN203J	.10
C-9, 26 and 52	0.05 mfd; +40 −10%; 400 vdcw; paper	46AW503J	.10
C-10	24 mmf; ± 20%; 500 vdcw; neg. temp. coeff. 750 mmf/mmf/deg. C.; ceramic	CC21UK240M	.15
C-11	15 mmf; ± 20%; 500 vdcw; neg. temp. coeff. 750 mmf/mmf/deg. C.; ceramic.	CC21UK150M	.15
C-16	390 mmf; ± 20%; 500 vdcw; mica	CM20A391K	.15
C-17, 53 and 56	0.01 mfd; +80 −10%; 400 vdcw; paper	46AW103J	.10
C-18	100 mmf; ± 10%; 500 vdcw; neg. temp. coeff. 0.00075 mmf/mmf/deg. C.; ceramic.	CC25UK101K	.15
C-23	2645 mmf nominal; padder for transformer T-10	44B141	.30
C-24	1300 mmf nominal; padder for transformer T-11	44A924	.35
C-25	490 mmf nominal; padder for transformer T-12	44A142	.25
C-26	3 mmf ± 0.2 mmf at 25 deg. C.; temp. compensating for oscillator stage	44A158	
C-27, C-50 and C-51	Electrolytic; 3 section unit; coded lug terminals; sect. 1 (C-50) 30 mfd, +40 −10%; sect. 2 (C-27) and sect. 3 (C-51) each 10 mfd, +40 −10%; all sections 450 wvdcw.	45A062	1.60
C-29 and 30, 33 and 34	Dual trimmer unit for IF transformers T-13 and T-14	44A095	.25
C-31 and 43	0.02 mfd; +40 −10%; 200 vdcw; paper	46AU203J	.10
C-36 and 37	Dual trimmer unit for IF transformer T-15	44A098	.25
C-38	2 mmf gimmick; formed by twisting two insulated wire leads; NOT AVAILABLE AS A REPLACEMENT PART, SHOWN FOR REFERENCE ONLY.		
C-39, 45 and 46	0.02 mfd; +40 −10%; 500 vdcw; paper	46AY203J	$ .10
C-41 and 42	47 mmf; ± 2%; 500 vdcw; mica	CM20A479M	.10
C-44	270 mmf; ± 10%; 500 vdcw; mica	CM20A271K	.15
C-46	Electrolytic; 30 mfd; +250 −10%; 25 vdcw; axial stranded wire leads	45A034	.35
C-47	0.002 mfd; +40 −10%; 300 vdcw; paper	46A104	.10
C-49	0.1 mfd; +40 −10%; 400 vdcw; paper	46AV104J	.10
C-54	560 mmf; ± 5%; 500 vdcw; mica	CM25AE	.15
C-55	100 mmf; ± 5%; 500 vdcw; mica	CM20A101M	.10
C-57	[illegible] mfd; +40 −10%; 600 vdcw; paper 1000 mmf/mmf	46AZ302J	.10
	JACKS		
J-1	PHONES jack; closed circuit; short body; accepts standard headset plug	36A002	.30
	LAMPS		
LM-1 and 2	6.8 v@ 250 ma; blue bead; G.E. type 44	39A003	.10
	LOUDSPEAKER		
LS-1	5" P.M. speaker; 3.2 ohm voice coil		
	PLUGS		
PL-1	AC line cord and standard 2 prong plug	87A078	.35
PL-2	AC operating shorting plug; Amphenol octal, male, type CP-8; includes jumpers wired between pins 1, 4 and 6, 7	35A003	.10
PL-3	Speaker connecting plug; Cinch type 2749; part of speaker LS-1 assembly	10A197	.10
	RESISTORS		
R-1 and 15	100,000 ohms; ± 20%; ½ watt; carbon	RC20AE104M	$ .10
R-2	120 ohms; ± 10%; ½ watt; carbon	RC20AE121K	.10
R-3 and S-6	SENSITIVITY control; 10,000 ohms; includes SPST toggle action switch (S-6) on rear	25A533	.50
R-4	22 ohms; ± 5%; ½ watt; carbon	RC20AE220M	.10
R-5, 18 and 32	1,000 ohms; ± 20%; ½ watt; carbon	RC20AE102M	.10
R-6	6,800 ohms; ± 10%; ½ watt; carbon	RC20AE682K	.10
R-7	10,000 ohms; ± 10%; ½ watt; carbon	RC20AE183K	.10
R-8	10,000 ohms; ± 10%; 2 watt; carbon	RC41AE103K	.10
R-9 and 11	1,000 ohms; ± 10%; ½ watt; carbon	RC20AE102K	.10
R-10	12,000 ohms; ± 10%; ½ watt; carbon	RC20AE123K	.10
R-12	2.2 megohms ± 20%; ½ watt; carbon	RC20AE225M	.10
R-13	1 megohm; ± 20%; ½ watt; carbon	RC20AE105M	.10
R-14 and 29	47,000 ohms; ± 20%; ½ watt; carbon	RC20AE473M	.10
R-17, 19 and 22	270,000 ohms; ± 10%; ½ watt; carbon	RC20AE473M	.10
R-20	AUDIO GAIN control; 500,000 ohm	25A534	.35
R-21	150 ohms; ± 20%; ½ watt; carbon	RC20AE151M	.10
R-23	470,000 ohms; ± 20%; ½ watt; carbon	RC20AE474M	.10
R-24	680 ohms; ± 10%; 1 watt; carbon	RC31AE681K	.10
R-25	15,000 ohms; ± 20%; 1 watt; carbon	RC31AE153M	.10
R-26	12,000 ohms; ± 10%; 2 watt; carbon	RC41AE123K	.10
R-27	10,000 ohms; ± 10%; 4 watt; carbon	RC65CE103K	.10
R-28	15,000 ohms; ± 20%; 2 watt; carbon	RC41AE153M	.10
R-30	10 ohm; ± 20%; ½ watt; carbon	RC20AE100M	.10
R-32	1,500 ohm; ± 10%; 10 watt; wire wound	24BG150E	.30
R-33	15 megohm; ± 20%; ½ watt; carbon	RC10AE156M	.10
R-34	10,000 ohms; ± 20%; ½ watt; carbon	RC20AE103M	.10

REF. NO.	DESCRIPTION	HALLICRAFTER'S PART NUMBER	LIST PRICE PER COMPONENT
	SWITCHES		
S-1	BAND SELECTOR; 3 sections ganged; 4 position; each wafer is individually mounted in chassis, ganged by indexing shaft.	62B039	$ .25
	2 bakelite wafers (S-1A through D)	62B044	.25
	1 bakelite wafer (S-1E and F)	74C172	.05
	Shaft and index assembly		.10
S-2, 3, 5 and 7	A.V.C. ON/OFF; SPST; toggle; 3 amp @ 250 volts	60A138	.25
S-4	TONE and AC line switch; 2 sections ganged; 1 sect. (S-4A) Single Pole 4 Position; 2 sect. (S-4B) SPST; rotary action; sect. 2 rated 3 amp @ 125 volts or 1 amp @ 250 volts, AC; bushing mtg.	60A225	.45
S-6	"S" meter; SPST; refer to R-3; NOT AVAILABLE AS A SEPARATE REPLACEMENT PART.		
	SOCKETS		
SO-1	DC power source input socket; octal, female, Amphenol type MIP-8	6A035	.10
SO-2	Connection for external "S" meter; 5 contacts, female, Amphenol type MIP-5	6A186	.10
SO-3	Speaker plug connection; 5 contacts, female, Cinch type 2649-B	6A246	.10
	TRANSFORMERS		
T-1	Antenna coil for Band 4; variable iron core	51B783	
T-2	Antenna coil for Band 3; variable iron core	51B782	
T-3	Antenna coil for Band 2; air core	51B781	
T-4	Antenna coil for Band 1; air core	51B780	
T-5	Mixer coil for Band 4; variable iron core	51B787	
T-6	Mixer coil for Band 3; variable iron core	51B786	
T-7	Mixer coil for Band 2; air core	51B785	
T-8	Mixer coil for Band 1; air core	51B784	
T-9	Oscillator coil for Band 4; variable iron core	51B791	
T-10	Oscillator coil for Band 3; variable iron core	51B790	
T-11	Oscillator coil for Band 2; variable iron core	51B789	
T-12	Oscillator coil for Band 1; variable iron core	51B788	
T-13	1st IF transformer; 455 kc; shielded	50C185	
T-14	2nd IF transformer; 455 kc; shielded	50C186	
T-15	Diode IF transformer; 455 kc; shielded	50C192	
T-16	Audio output transformer; part of loudspeaker LS-1 assembly but available as a separate replacement part.	54B028	
T-17	BFO coil; 455 kc; shielded		
T-18	Power transformer; primary—117 volt AC, 50/60 cycle; high voltage secondary 342 volts each side of center tap (no load); filament secondary 6.3 volts @ 3.5 amp; rectifier filament secondary 5 volt @ 2 amp; solder lug terminals at base	52C026	3.30
T-18*	Power transformer; same as T-18 above, except primary—110/130/150/220/250 volt AC, 25 cycles.	52C027	8.35
	*This transformer is available on special order only, and is not standard equipment for this model		
	TERMINAL STRIPS		
TS-1	Antenna and ground connector strip; marked "A1", "A2" and "G" on face; Cinch type 1738	86A032	.10
	MISCELLANEOUS MECHANICAL COMPONENTS		
QUANTITY IN EQUIP.			
3	Octal tube sockets	6A035	.10
4	4 prong tube socket; for rectifier	6A025	.10
1	Pilot lamp socket; main tuning dial; bayonet base	86A033	.10
1	Pilot lamp socket; bandspread dial light; bayonet base	86A034	.10
1	Bandspread knob drive shaft	74A170	.10
1	Main tuning knob drive shaft	74A171	.10
1	Bandspread dial drive shaft	74A189	.10
1	Bandspread dial drive pulley	28A012	.40
1	Bracket; main tuning and bandspread dial drive	67B043	.30
1	Flywheel; bandspread tuning	71A169	.50
1	Pulley; 9" O.D.; capacitor drive; main tuning	28A002	.10
1	Pulley; 2" O.D.; capacitor drive; bandspread tuning	28A019	.10
1	Calibrated scale; main tuning	83C240	.65
1	Calibrated scale; bandspread tuning	83B254	.75
1	Escutcheon; main tuning dial; includes window	70D017	.75
1	Escutcheon; bandspread tuning dial; includes window	7C034	1.85
2	Tension springs; dial cabling	75A012	.10
4	Cabinet mounting feet; rubber	16A007	.10
2	Knobs; main tuning and bandspread controls	15A047	.25
3	Knobs; SENSITIVITY, VOLUME and TONE controls	15A049	.10
1	Knob; BANDSWITCH control; aluminum	15B053	.40
1	Knob; PITCH CONTROL	15A056	.10
1	Top cover for receiver cabinet	66D285	2.50
1	Receiver cabinet	66E284	2.85

Note: All prices are subject to change without notice.

Farnsworth Models

The parts shortage has resulted in the substitution of various types of tuning capacitors without change in part numbers stamped on them. In ordering replacement tuning capacitors for ET-060, 061, 063, 064, 065, 066, 069; EK-263, 264, and 265 the following suggestions should be observed:

Gang Capacitor with 21 plate oscillator section requires the removal of trimmer from r-f section of gang if the loop antenna has a r-f trimmer located on it. This capacitor used B.C. oscillator coil #38483 and, if an S.W. oscillator coil is used requires S.W. oscillator coil #38549. Both of these coils have a white dot to indicate finish lug.

A #26239 gang capacitor with 19 plate oscillator section (identified by red dot on rear) may require the removal of r-f trimmer as explained above. This capacitor requires B.C. oscillator coil #38706 and S.W. oscillator coil (if used) #38709. These oscillator coils are marked with a yellow dot at the finish lug.

The following is an alignment hint for the Farnsworth models with respect to the use of the antenna:

The antenna should be held in a vertical position, ⅜ inch from the back side of the radio chassis in order to maintain the maximum output of the antenna after being installed in the cabinet. Therefore, we suggest some type of a jig to be made out of scrap material found around the service department to hold said antenna in the proper position while the serviceman is realigning the radio out of the cabinet. This suggestion is very helpful in getting the best operation out of the radio and, in addition, saving expense and time.

GALVIN DIAL CORD SLIPPAGE

Dial slippage encountered in 1946 home sets using slide rule type dials can easily be remedied by restringing using two dial cords.

Formerly, a single cord and tension spring was used for both driving the tuning capacitor and moving the pointer. It is recommended that two cords and tension springs be used; one for driving the tuning capacitor and one for moving the pointer.

Before removing the old cord, make a sketch showing the old cord layout. This will assist greatly in restringing.

First install the drive cord between the tuning shaft and tuning capacitor pulley. It is to be routed in exactly the same manner as the old cord was, except run it only between the tuning shaft and tuning capacitor pulley. Be sure to wind 3 turns around the tuning shaft. The old tension spring is used to provide tension on the cord by hooking in exactly as before. Use the cord originally on the set for this purpose, except cut it down to the required length.

Install the pointer cord supplied by routing it in the same fashion as before except that it does not go to the tuning shaft. Simply run it to the tuning capacitor pulley and apply light tension to it with the attached tension coil spring. There are several holes in the tuning capacitor pulley through which the tension spring may be hooked and/or adjusted.

To calibrate pointer, simply turn the tuning capacitor to the fully meshed position and set pointer to "V" notch or calibration mark provided.

Use a drop of household cement to fix pointer to cord. A drop of cement on all knots will secure them.

Gamble-Skogmo 43-7601, 43-7601A, 43-7601B

These models, shown on *pages 16-1 to 16-5 of Rider's Volume XVI*, use the General Instrument Record Changer model 205, which can be found on *pages RCD.CH. 15-5 to 15-8 of Rider's Volume XV*.

General Electric 250

To reduce the hum in this model, which is found on *pages 15-32 to 15-36 of Rider's Volume XV*, it is suggested that the following change be made.

Resistor R16 (2200 ohms) should be removed from the negative battery terminal lug, lengthen pigtail, insulate with a spaghetti covering, and solder to the ground lug of the terminal board located at socket saddle of the 1LH4 tube.

An appreciable increase in duration of operation from a fully charged battery in this model can be effected in the following manner, realizing, however, that some degree of performance is sacrificed in regard to sensitivity and power output. Replace power-supply filter resistor, R17 (1500 ohms) with one of 4700 ohms, 1 watt, carbon. This change should be made only when the customer demands a longer duration of operation to one battery charge.

Hallicrafters S-38

In the event that an a-c hum develops in this receiver, the schematic of which appears on *page 15-59 of Rider's Volume XV*, it has been found that the 35Z5GT is the cause of the trouble, even though the tube passes a normal test. Also, other tubes in this set have been known to cause hum. Try replacement tubes.

Another cause is a high resistance ground between the chassis and the case. This usually develops through the rubber mounting grommets or through the switch mounting rivets. Occasionally it may be a defective 25-μf capacitor (C36), which should be replaced if defective. It is possible that C36 is not of the correct value. Check this point.

If this set loses sensitivity after being in use for approximately a half hour, replace the 12SA7GT/G tube, as an investigation has revealed that this condition is due to a certain percentage of Hytron tubes of this type, of a particular production run marked 1/6, 2/6, 1A6, or 2A6. The replacement should have any other marking than those listed previously.

Hallicrafters S-40

In the event that band 4 (15.7 to 43 mc) fails to operate at all times, but reception on other bands is normal, trouble is indicated in the oscillator circuit of this band, which in most cases can be traced to a weak 6SA7 oscillator tube or low line voltage. In those few cases where trouble persists, even though all voltages are normal and the tube has been replaced, this trouble can be remedied by replacement of the oscillator coil T9 and capacitor C18, as follows:

Replace T9 oscillator coil, part #51B791 containing 7 primary turns, with part #51B791B, having 10 primary turns. Change capacitor C8 (100 $\mu\mu$f) to part #CC25UK680K, 68 $\mu\mu$f. Connect the cathode lead from terminal 6 of the 6SA7 (V2) to T9 direct to the secondary winding where it leaves the coil form rather than to terminal lug "A" on the top of the coil form. (See sketch of coil form on *page 15-67, 68 in Rider's Volume XV.*) Replacement coils are furnished without the iron cores, as they are interchangeable. If new cores are needed, due to loss or breakage, they can be ordered under part #77A068.

If the receiver cannot be placed in "break-in" operation, apply the following remedy: Notice on the schematic of the receiver on *page 15-67, 68 in Rider's Volume XV* that the grid of V6 the output 6F6G tube is connected to the power switch S7, so that when the switch is in the "send" position the grid of this tube is grounded. Many operators wish to leave this switch in the "send" position and connect from terminal 5 on the plug PL2, through the transmitter relay to ground. In order to do this, the lead between S7 and V6 should be removed. On later production runs, this lead has been eliminated. See notes on "Power Requirements" and "Preparation for Use" on *page 15-71 of Rider's Volume XV.*