INSTRUCTION BOOK

for the

ACR-175

PART I—INTRODUCTION

1. General

This new Amateur Receiver covers a range of 500 to 60,000 kilocycles and is adapted for c-w reception. It embodies the latest features of design and construction including: the most reliable and stable circuits; new metal tubes; calibrated beat-frequency oscillator; crystal filter; and sensitivity control, with calibrated indication of signal input when used in connection with the electron-ray-tube tuning indicator. The sensitivity and selectivity of this instrument, together with its frequency stability and reliability, open to the listener an actual field of reception covering practically all communications available on the air.

This book should be studied carefully, so that you may learn how to make full use of this instrument and keep it in its optimum operating condition.

2. Special Features

The use of the most recent dependable electrical developments in receiver design are evident from an inspection of the schematic circuit diagram (Fig. 3,) and the chassis wiring diagram (Fig. 6). The *new metal tubes* provide particularly effective shielding as well as minimum terminal spacing and short connecting circuits.

Nine controls on the front of the instrument give complete front panel adjustment. The *Calibrated Sensitivity Control* or *Signal Input Control* provides for direct measurement of input signals in terms of an absolute value, the microvolt, thus affording a means of giving accurate signal strength reports. An *AVC Switch* allows one to dispense with the use of the *Automatic Volume Control* when desired. The *Tuning Control* operates on reduction ratios of 20:1 and 100:1, enabling one to make either rapid or unusually fine adjustments for precise tuning. The *Crystal Filter* in the first i-f stage provides single-signal reception with an unusually high degree of selectivity. The adjustable *Selectivity Control* is a means of obtaining various degrees of selectivity with or without a rejection dip. The *Electron-Ray-Tube Indicator* fulfills the dual function of measuring signal input and aiding in precise tuning.

The *Beat Oscillator* is equipped with two controls, an "on-off" switch and a calibrated *Heterodyne Control* with induction tuning, which effectively governs the pitch. The shield enclosing the entire beat-oscillator circuit enables the listener to operate the set with freedom from undesirable beat notes due to harmonics. Code messages and other continuous wave transmissions, as well as modulated signals of very low strength and those with the carrier not modulated continuously, are all clearly brought through by proper manipulation of the beat oscillator controls.

Each instrument is carefully tested and calibrated before leaving the factory.

The *Loudspeaker* is a separate unit attached to the chassis by means of a cable with a six-prong plug-in connection. It is mounted on a small baffle with easel supports. Holes are provided for mounting on a larger baffle when high-quality reproduction is required.

PART II—ELECTRICAL SPECIFICATIONS

3. Tuning Range

Band Letter	Band Limits			Band Services
	Kilocycles	*Megacycles*	*Meters*	*Major Transmissions*
A	500–1,690	0.5–1.69	600–176	Ships—Standard Broadcast
B	1,690–6,200	1.69–6.2	176–48.4	160 and 80 m. Amateur—Police—Aviation
C	6,200–15,450	6.2–15.45	48.4–19.6	40 and 20 m. Amateur—S-W Broadcast
D	15,450–60,000	15.45–60	19.6–5	10 and 5 m. Amateur—Police—S-W Broadcast

4. Circuit Data

Circuit.—Superheterodyne with beat-frequency oscillator for c-w reception, crystal filter, automatic volume control, electron-ray indicator with calibrated signal input (sensitivity) control, and class A pentode output system.

Intermediate Frequency. — (includes crystal resonator)—460 kilocycles.

Power Output.—2 watts (undistorted); 4½ watts maximum.

Loudspeaker. — (separate unit) — Electrodynamic 8-inch (voice-coil impedance 2¼ ohms at 400 cycles).

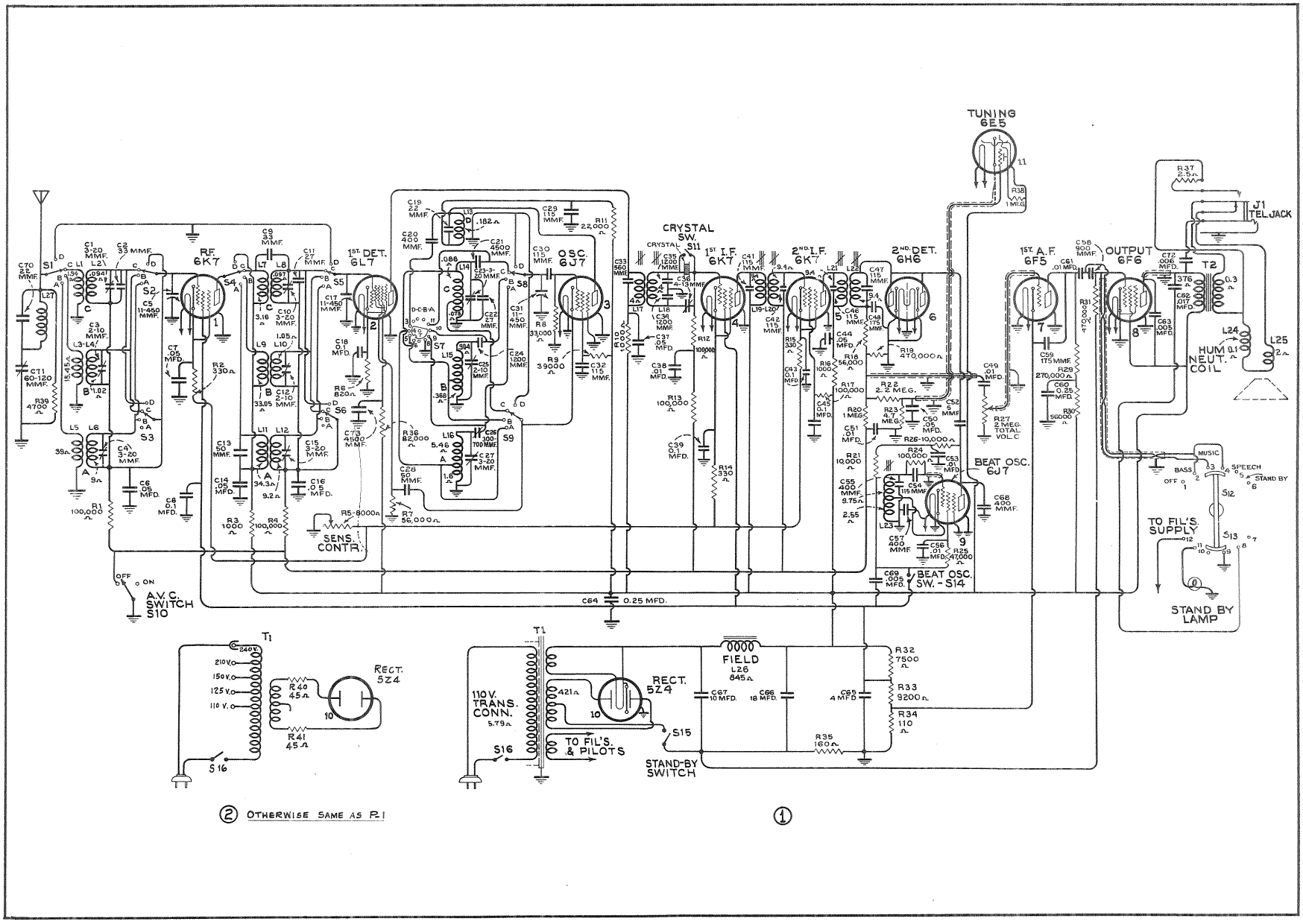


Figure 3—Schematic Circuit Diagram.

Tubes

1 RCA-6K7—Radio-Frequency Amplifier.
1 RCA-6L7—First Detector.
1 RCA-6J7—Oscillator.
2 RCA-6K7—Intermediate-Frequency Amplifiers.
1 RCA-6H6—Second Detector and A.V.C.
1 RCA-6J7—Beat-Frequency Oscillator.
1 RCA-6F5—Audio-Frequency Amplifier.
1 RCA-6F6—Power-Output Amplifier.
1 RCA-5Z4—Full-Wave Rectifier.
1 RCA-6E5—Tuning Indicator.

See diagram on label inside cabinet for locations of tubes and grid leads.

Power-Supply Ratings.—See rating symbol on chassis.

Symbol	*Voltages*	*Frequency (cycles)*
B	105–125	25–60
C	100–130; 140–160; 195–250	40–60

As shipped from the factory, rating "C" instruments are connected for 225-250 volts unless prominently specified otherwise on instrument. Any of these, however, can be converted for operation at 100-117, 117-130 or 195-225 volts when required. Three taps are provided on the primary of the power transformer, a diagram of which is given in Figure 8. All taps are brought out to a terminal board on the top of the transformer and conversion can be made without removing chassis.

Power Consumption.—110 watts.

5. Antenna

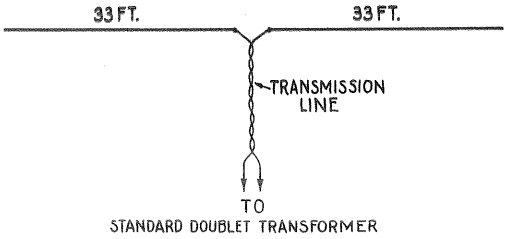
A most important factor in good reception is the antenna. Both "noise reducing" and "directional" properties as well as a definite "length" to suit the signal frequency are essential antenna requirements for good reception. A special system or one of multiple antennas of the *single-wire* or *doublet* type is therefore necessary. The RCA *Double-Doublet* antenna system consists of *two* doublet antennas having different lengths and therefore different resonance characteristics. They are interconnected so that one will compensate for the weak points of the other throughout the intervening frequency range. A *Triple-Doublet* system of lengths cut to suit individual requirements will give still better results. Be sure to obtain the latest information on RCA Antennas. Dipole lengths, as listed in the following table, connected with the coupling transformers specified, are recommended for the respective amateur bands.

Band	Length each side	Coupling Transformer	
Meters	*Feet*	*Type*	*Stock No.*
160	130	Aircraft Doublet	M.I. 5782
80	65	Aircraft Doublet	M.I. 5782
40	33	Standard Doublet	4743
20	16½	Standard Doublet	4743
10	8	Standard Doublet	4743
5	4	Standard Doublet	4743

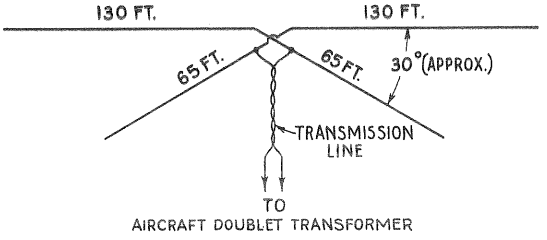
The triple- or double-doublets are most easily applied to those bands for which the same coupling transformer can be used. For example, a double-doublet with an aircraft type coupling transformer would be best for 160 and 80 meters, or with a standard transformer on 40 and 20 meters, but not with either transformer on 80 and 40 meters.

Proper cross connections must be made on all dipole systems as illustrated in Figure 4.

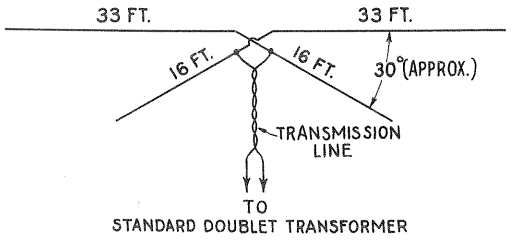
Standard RCA Transmission Line should be used. Lengths are not critical for the above resonant antenna conditions.



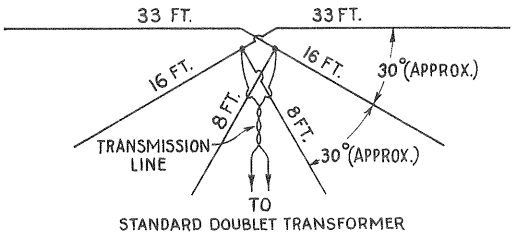
(a) Single Doublet Antenna for 40 Meter Band



(c) Double Doublet Antenna for 160 and 80 Meter Bands



(b) Double Doublet Antenna for 40 and 20 Meter Bands



(d) Triple Doublet Antenna for 40, 20 & 10 Meter Bands

Figure 4—Dipole Antenna Crossover Connections.

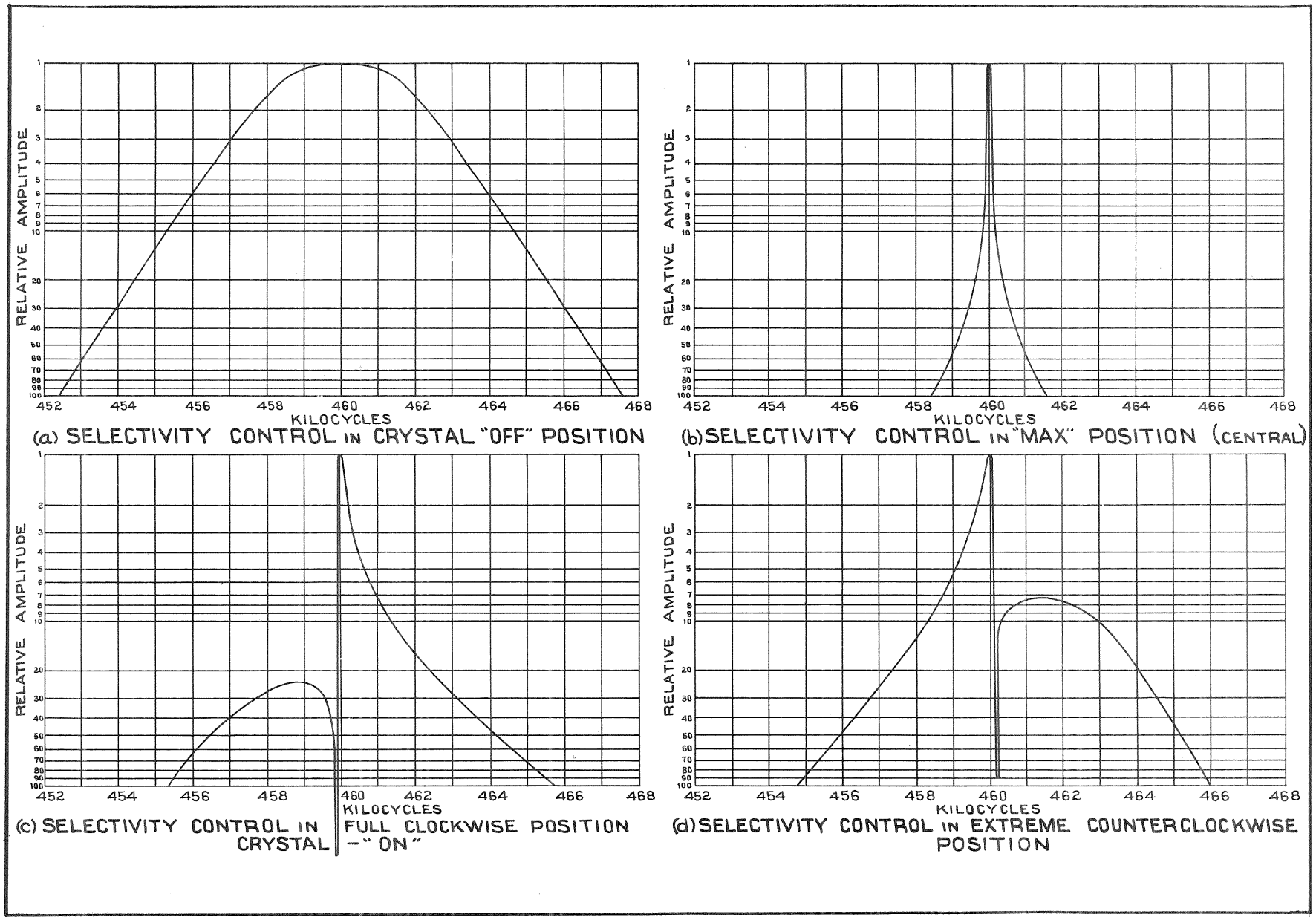


*Figure 5—Selectivity Control Curves.—**Crystal Filter.***

PART III—OPERATION

6. Controls

All controls are located upon the front panel and are identified by adjacent markings.

(a) **Power Switch and Tone Control.**—The first control on the left is a five-position knob operating the a-c line power switch, high-frequency tone control ("Bass"), full tone range contact ("Music"), low-frequency tone control ("Speech"), and "Stand-by" switch, in the sequence given as the knob is turned in a clockwise direction. Power is "off" with this knob in its fully counter-clockwise position. The "Bass" position eliminates "highs" and therefore emphasizes low tones. It reduces static interference due to restriction of the audio response range. The "Music" position gives full tone range reproduction. The "Speech" position reduces the "lows" and emphasizes the high tones, thus clarifying "boomy" voice reception. The "Stand-by" position disconnects all plate and screen grid tube-supply voltages but leaves the filament supply turned on to keep the receiver "warmed up" and ready for instant operation. It also illuminates the "Stand-by" lamp on the left-hand side of the dial. The "Stand-by" is of special use for eliminating the clicks or thumps of the telegraph transmitter, for preventing acoustical feed-back from a phone transmitter, or an adjacent transmitter from blocking the receiver.

(b) **Signal Input Control.**—The second control from the left rotates on a scale calibrated from 1 to 10,000 and its setting indicates the strength in microvolts of any signal delivered to the receiver, when its adjustment is made in conjunction with the electron-ray tube [see next paragraph (c)]. This control is calibrated on a logarithmic scale by means of a series of dots. The markings are labelled for the major settings only, and the points between these major markings represent respectively two and five times the lower indicated value as the knob is turned in a counter-clockwise direction (1, 2, 5, 10, 20, 50, 100 — --).

(c) **Electron-Ray-Tuning Tube.**—The green illuminated *Electron-Ray-Indicator Tube* (RCA-6E5) at the right-hand side of the dial near the top of the front panel is a visible guide to precise tuning. The deflection of the electron stream by the signal voltage causes a narrowing of the darker sector. Maximum deflection, (*i. e.*, when the area of the light sector is at a maximum) indicates that the receiver is tuned to exact resonance.

Since the electron-ray tube gives a reading of signal strength (at the 2nd detector) it is used in conjunction with the *Signal Input Control* to measure signal input. Tune signal to exact resonance, as just described. Rotate the *Signal Input Control* counter-clockwise to reduce the voltage on the *electron-ray tube*. The point at which a slight deflection (1/64-inch) of the dark sector in the *electron-ray tube* occurs is the value in microvolts of the signal input to the receiver. For code reception the correct setting of the *Signal Input Control* to measure signal input is that at which the light green area just commences to flicker.

When measuring signal strength in microvolts it is immaterial whether AVC control switch is "on" or "off."

The calibrated signal input scale reads microvolts direct for the 160, 80, 40 and 20 meter amateur bands. For the 10 and 5 meter bands, multiply the reading by 10 to obtain microvolts.

The absolute accuracy of signal input values depends upon the sensitivity of the receiver. This is determined by accuracy of alignment, condition of tubes, value of line voltage and similar factors. Relative readings between two or more stations of different signal strengths always give dependable results for comparison. Signal input measurements are also useful for making tests on different types of antennas, for reporting improvements to transmitters at distant amateur stations, and for making charts of signal strength variations.

(d) **The Selectivity Control** introduces the crystal filter into the i-f circuit for single-signal reception of c-w telegraph or telephone transmission. Crystal phasing is performed by means of an air-trimmer capacitor. In its midway position marked "Max." the crystal circuit is balanced and maximum selectivity is obtained. This setting is characterized by minimum background noise. In the extreme clockwise position the crystal is short circuited by means of the crystal switch. Other positions broaden the crystal selectivity curve on one side of resonance and cause a rejection dip on the other side. They are useful for phone reception through severe interference.

NOTE—The *Tone Control* should always be turned to "Speech" when the *Crystal Selectivity Control* is in use. This reduces the "lows" which cause instability and flutter under conditions of extreme selectivity.

Four curves are given herewith which illustrate the effect of the *Crystal Selectivity Control.* (See Figure 5.)

(e) **The Automatic Volume Control Switch** eliminates automatic-volume-control action in order to obtain best reception of slow-speed code transmission and to avoid thumping.

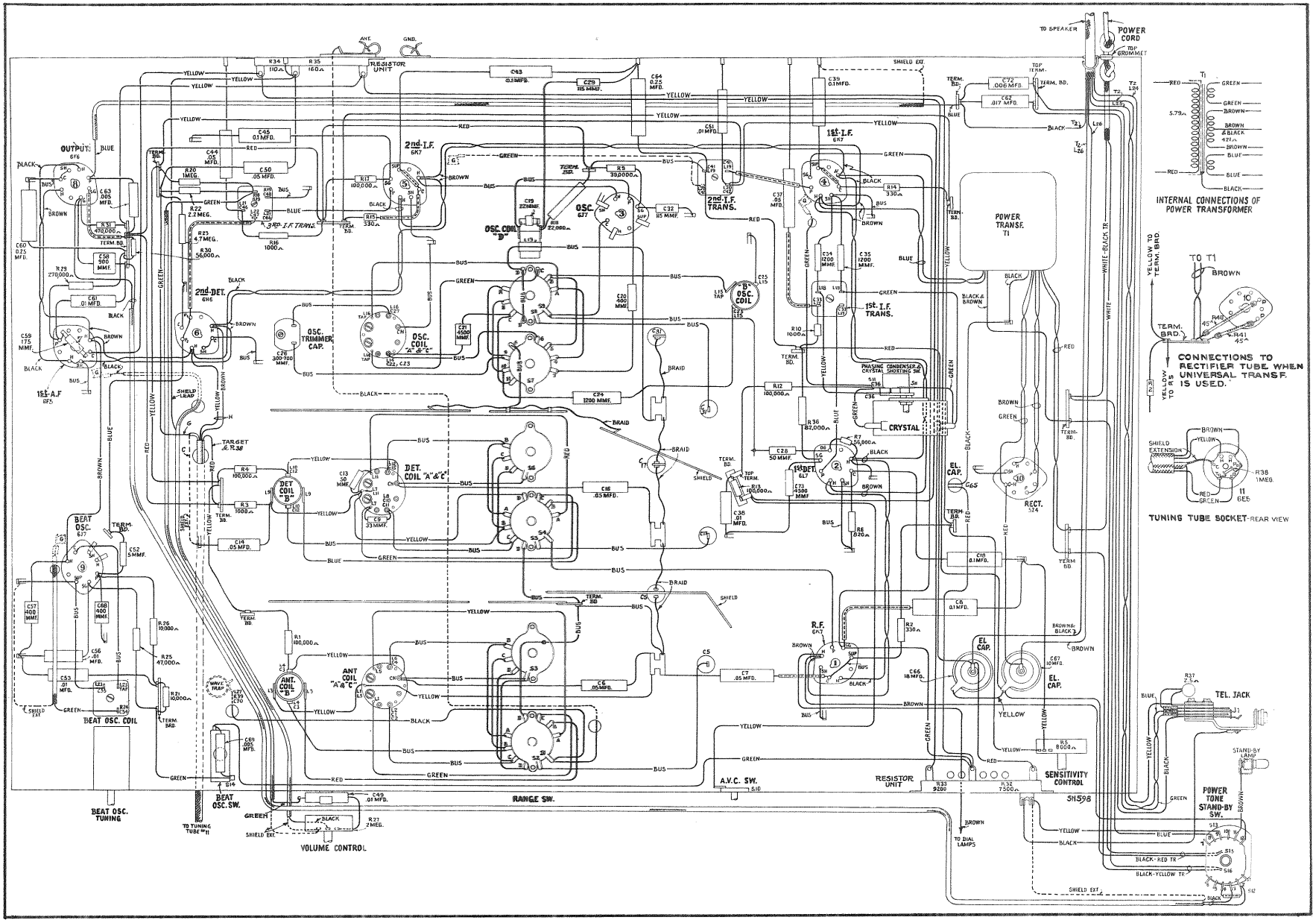


Figure 6—Chassis Wiring Diagram.

(f) **The Tuning Control** is a double knob. The section for rapid tuning is adjacent to the receiver panel and has a speed reduction ratio of 20:1. The second section, in front of the latter and on the inside shaft, is for precise adjustment and has a speed reduction ratio of 100:1. The combination of the high ratio tuning drive and the vernier-index dial make precise and easy tuning readily attainable.

(g) **The Range Selector** selects any one of the four scales of which the frequency limits are tabulated under "Electrical Specifications–Tuning Range" (Section 3). The lettered dial scales correspond to the lettered *Range Switch* positions.

(h) **The Volume Control** is connected in the audio-frequency circuit and increases the output level with clockwise rotation as indicated. It alone is used to regulate volume when the *Automatic Volume Control* is switched "on." However, with the AVC switch "off," the *Signal Input Control* must be used as well, in order to prevent overloading of the Second Detector.

(i) **The Beat Oscillator Switch** serves to interrupt screen and plate-supply voltage to the beat-frequency oscillator tube. The beat-oscillator stage can be rendered inoperative at any time, but, since the filament remains heated continuously, is ready for instantaneous operation.

(j) **The Heterodyne Control** governs the beat-oscillator output frequency over a limited a-f range by means of an iron-core solenoid adjustment (induction tuning) within the beat-oscillator tuning coil. It is calibrated in kilocycles on either side of the normal resonant position (zero beat). In order to obtain a beat note of a desired frequency it is first necessary to tune the receiver to zero beat with the *Heterodyne Control* set at "0," and then to rotate the *Heterodyne Control* to the desired a-f setting.

NOTE—It is important that the "0" position on the *Heterodyne Control* scale correspond *exactly* with the crystal frequency. The proper method of *setting* is given under Service, Section 12.

For c-w reception this control should be set at the desired beat frequency which may be on either side of the "0" position. The human ear is most sensitive at frequencies between 500 and 1500 cycles and settings of this order should therefore be made. The *Selectivity Control* then turned to "Max." has the effect of almost completely suppressing any audio-image which may be produced by a station at a frequency a few kilocycles removed from that of the desired station, causing a beat of nearly equal pitch. The curves (Figure 5) make this apparent. With the *Crystal Selectivity Control* in an intermediate position, adjustment and tuning may be made to place in the "rejection dip" an interfering station within a few hundred cycles of the desired one. The required beat-note is then obtained by adjustment of the *Heterodyne Control*. The higher the beat-frequency used the greater is the audio image.

(k) **The Phone Jack** is on the left end of the cabinet. When a phone plug is inserted in this jack, it simultaneously connects a resistance load across the secondary of the output transformer in place of the voice coil of the electrodynamic loudspeaker. It also connects the phones across the plate circuit of the output tube, a blocking condenser being used to isolate the d-c voltage. The loudspeaker field which is employed as a filter for the rectifier stage, still forms an active part of the circuit when using headphones. By inserting the phone plug part way in the jack both headphone and loudspeaker signals may be obtained. The loudspeaker is connected to the chassis by means of a cable and plug.

7. Dial

The *Tuning Dial* is of the airplane type, semi-transparent, illuminated, and clearly marked. It incorporates a mechanical band-spread system with two vernier scales (outside and central), particularly suited to amateur or other work where precise logging is required. The four main scales are plainly marked with their respective letters—A, B, C, D—and are calibrated directly in megacycles. The amateur bands are shown by solid arcs on the B, C and D scales, together with meter markings in heavy type. The standard and short-wave broadcast bands are indicated by an additional shading line.

The two vernier scales mentioned above are known as the *vernier* and *vernier-index* scales, the former being fully circular and the latter semi-circular.

It will be observed that the *vernier* scale is graduated from "0" to "100" and traversed by the long single-ended red pointer, and that the *vernier-index* scale is graduated from "0" to "9" and traversed by the short double-ended black pointer used for the main frequency scales. The red pointer makes one complete revolution for each unit of travel of the short black pointer on the *vernier-index* scale. Thus, any station may be logged accurately with three digits; for example, if the *vernier-index* reading is between "3" and "4" and the *vernier* reading is "72," then the log number is "372." The index number is always the lower of the two numbers between which the pointer is located. (It may occasionally happen that with the *vernier-index* pointer on or just beyond a digit, the *vernier* pointer may read above 95; the next lower digit is then used as the first of the three figures in the reading.)

In logging stations by this method, the band letter also should be named. For the above example, therefore, the full log number would be "A-372," "B-372," "C-372," or "D-372" depending upon the setting of the range switch.

Band-Spread.— The *Mechanical Band-Spread* incorporated in this instrument is combined with circuit design in such a manner as to render available to the operator the following advantages:

1. Single-control tuning.
2. Precise logging.
3. Ability to reset to a definite frequency without use of reference points.

To assist in operation, a table is given of the tuning knob rotation when tuning through the various amateur bands.

Band		Band-Spread		
Meters	*Kilocycles*	*Pointer Coverage Dial Divisions*	*Slow Speed Knob Angle of Rotation*	
160	1715-2000	366	3590°	10 Rev.
80	3500-4000	141	1380°	3¾ "
40	7000-7300	96	940°	2½ "
20	14000-14400	55	540°	1½ "
10	28000-30000	74	725°	2 "
5	56000-60000	74	725°	2 "

8. Tuning

The r-f amplifier, oscillator and first detector circuits of this superheterodyne receiver are tuned by a three-gang variable capacitor and thus controlled from a single knob. Extremely precise and rapid tuning is attained by means of the dual-ratio vernier-drive system used in conjunction with the gang capacitor as mentioned under "Controls." To tune the instrument for desired reception, proceed as follows:

(a) Turn *Power Switch* "on."

(b) Select position of *Range Switch* at which the band letter corresponds to that frequency scale which includes the desired station or channel.

(c) Set *A.V.C. Switch* "on" and *Beat Oscillator Switch* "off."

(d) Turn *Crystal Selectivity Control* fully clockwise to "Crystal off" position.

(e) Advance *Signal Input Control* fully clockwise for maximum sensitivity.

(f) Advance *Volume Control* clockwise until background noise is heard.

(g) With rear part of tuning knob, rotate black pointer to approximate frequency of desired station, then with the front part make slow adjustment to the exact center of the carrier, as indicated by the *Electron-Ray Indicator*.

(h) Decrease volume as necessary and set *Tone Control* to "Bass," "Music" or "Speech" for preferred quality of reproduction. Full tone range reproduction is obtained with the knob set to "Music."

(i) **Silent Tuning** may be obtained by reducing the volume until no signals are heard, and then tuning by means of the visual indications of the electron-ray tube.

(j) **Weak Modulated Signals.**—The beat-oscillator may be used to advantage in locating weak, modulated signals. For this purpose it should be tuned exactly to the intermediate frequency of the receiver by turning the *Heterodyne Control* to "0," so that an audio-frequency note of ascending pitch will be obtained on each side of resonance of the incoming signal when the *Beat-Oscillator Switch* is turned "on." Any other carrier will be tuned to exact resonance when the gang or tuning capacitor is adjusted for "zero beat" and weak signals will be located almost as well as those of greater strength because of the heterodyne "whistle" produced while passing through resonance. After proper adjustment has been made, turn *Beat-Oscillator Switch* "off."

(k) **C-W Signals.**—For c-w (code) reception, the tuning procedure is the same as for modulated signals except that the *Beat-Oscillator* performs a definite rather than incidental function. It is set, not at the intermediate frequency, but slightly above or below so as to provide an audio-frequency beat note when the receiver is tuned to resonance with any carrier. Adjust the pitch with the *Heterodyne Control* knob. Turn *A.V.C. Switch* "off" when receiving slow speed c-w transmission.

(l) **Selectivity.**—The value of the *Crystal Selectivity Control* is most evident on c-w reception. Its importance should not be forgotten in phone reception and for identification of distant stations which are normally lost in the background noise. The curves (Figure 5) should be studied carefully before operating the *Selectivity Control*. The following suggestions also may be of value:

1. Tuning is extremely critical with control in the "Max." position and in consequence the movement of the slow speed *Tuning* knob should be *very slow* and deliberate.
2. First locate the desired band or station with control at "Crystal off," i. e. in its position of minimum selectivity.
3. Remember to set *Tone Control* at "Speech" for stable operation of *Crystal Selectivity Control*.

PART IV—SERVICE

9. General

The various diagrams of this booklet contain such information as will be needed for servicing the receiver. The ratings of all resistors, capacitors, coils, etc., are indicated adjacent to the symbols signifying these parts on the diagrams. The coils, reactors, and transformer windings are rated in terms of their d-c resistances only. Ratings of less than one ohm are generally omitted. Identification titles such as R-3, L-2, C-1, etc., are provided for reference between the illustrations and replacement parts.

10. Circuit Arrangement

A schematic diagram of the complete circuit is shown in Figure 3, a wiring diagram illustrating the

wiring layout of the radio chassis, and the wiring and connections between radio chassis and front panel controls, is detailed in Figure 6. The loudspeaker wiring diagram and connections to chassis are shown in Figure 7.

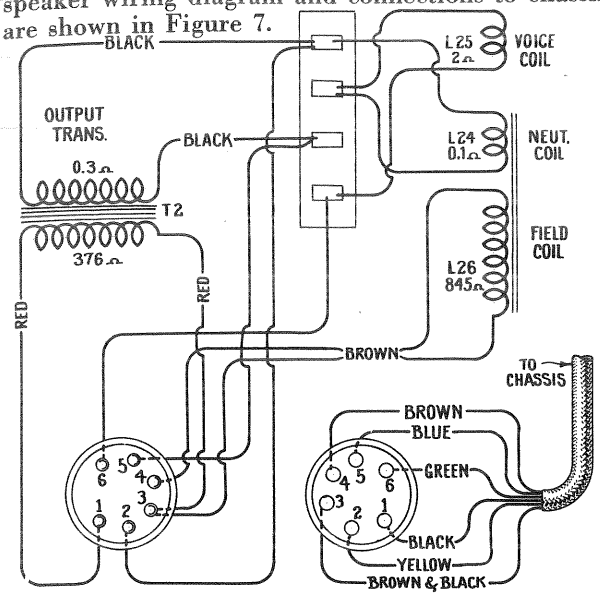


Figure 7—Loudspeaker Wiring and Connection Diagram

The circuit is based on the superheterodyne principle. The radio frequency and audio frequency amplification are balanced in such a manner that the maximum of performance is obtained. The main circuit features are as follows:

(a) **Tuned Circuits.**—A three-section variable condenser tunes the secondary of the antenna transformer, the secondary of the detector input transformer, and the oscillator coil on the A, B and C bands. The D band has only its detector and oscillator tuned. Each tuning range has its own group of r-f and oscillator coils which are selected as desired by operation of the band-change switch. Six adjustable inductance (iron-core) tuned circuits are used in the i-f system, each resonating at 460 kilocycles.

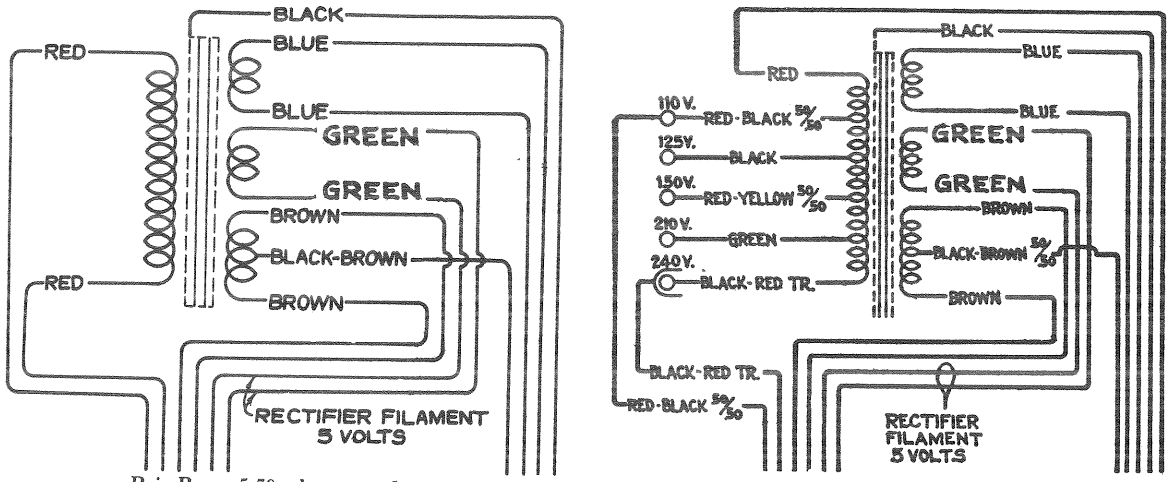
(b) **Band D Tuning.**—The r-f stage is idle when the range switch is turned to its band D position and the signal is fed from the antenna directly to the first detector input circuit. The inductance of this circuit consists of a short length of bus wire to which the antenna lead is tapped at a definite predetermined point. The total length of this inductive wire from the stator of the tuning capacitor to ground represents the secondary of a high frequency auto transformer, while the inductive section, included between the antenna lead tap and ground, forms the primary. Alteration of the dimensions and position of this wiring will change the tuning alignment of the circuit resulting in total lack of operation or seriously poor operation. *It is therefore necessary when servicing to avoid changes in the wiring which includes band D detector and oscillator r-f circuits, unless the arrangement is restored to its exact original condition.* Similar caution should be observed when exchanging by-pass capacitors in these same circuits, since their values, physical positions, length of leads, quality of dielectric and other features are critical, and variations will definitely affect operation of the receiver. The small heater by-pass capacitors and ground terminals installed at the tube sockets are very important in this respect.

(c) **Oscillator Stage.**—The heterodyne oscillator circuit used in this receiver is an improved type, having exceptional frequency stability and uniformity of output over its various tuning ranges. It operates on fundamental frequencies which are fed to the first detector hexode tube (RCA 6L7) on an auxiliary mixing grid. The oscillator generates a signal which is at all times above the frequency of the incoming signal by 460 kilocycles. As shown by the schematic diagram, the cathode of the oscillator tube is above ground potential for r-f while the plate is effectively at ground potential. This particular arrangement, together with the plate and screen series resistors, makes the circuit independent of supply voltage variations in regard to stability and uniformity of output. Separate coils are used for each of the tuning ranges. The switching of the different bands is such as to short circuit certain idle coils which would absorb energy from the circuits used.

(d) **Intermediate Amplifier.**—Two stages of i-f amplification comprising three inductively tuned transformers and two RCA 6K7 tubes are arranged in cascade to operate at 460 kilocycles. The transformers have their primaries as well as their secondaries tuned by adjustable iron cores. Litz wire is used for the windings of all three transformers in order to provide the proper selectivity and gain. The crystal filter is introduced in the first i-f circuit by means of the crystal switch S-11 (Figure 3). A variable air-dielectric capacitor C-36 is operated by the selectivity control.

(e) **Detection and AVC.**—The modulated signal as obtained from the output of the i-f system is detected by an RCA 6H6 double diode tube. The audio frequency secured by this process is passed to the a-f system for amplification and final reproduction. The d-c voltage which results from detection of the signal is used for automatic volume control. This voltage which develops across resistor R-19 is applied as automatic control grid bias to the r-f, first detector and i-f tubes through suitable resistance capacitance filters. A portion of the audio voltage is passed to the volume control through capacitor C-49. The variable resistor (R-27), a manually controlled acoustically tapered potentiometer, selects the amount fed to the first a-f stage.

The frequency generated by the beat-oscillator (457 to 463 k.c.) for c-w reception is applied to the diode plate of the RCA-6H6 second detector tube through the capacitor C-52. This frequency mixes with the incoming intermediate frequency to produce an audio-frequency note which can be heard readily in the loudspeaker or phones. The



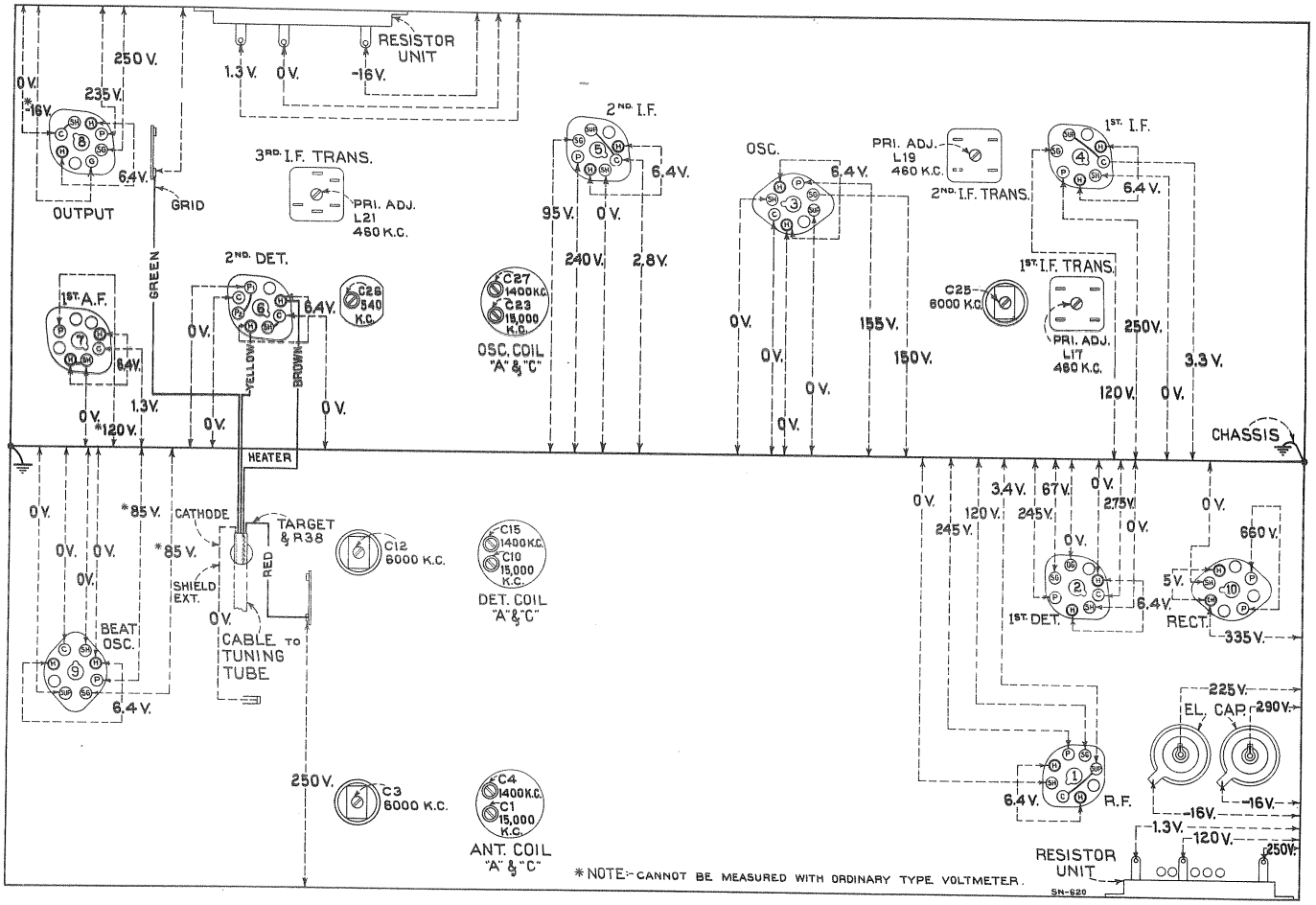
Pri. Res.—5.79 ohms, total
Sec. Res.—420 ohms, total

(a)—Standard Power Transformer

Pri. Res.—7.54 ohms, total
Sec. Res.—268 ohms, total

(b)—Universal Transformer

Figure 8—Transformer Wiring and Connections.



All voltages are measured with the Sensitivity Control at "1" (fully clockwise), Beat-Oscillator "on," Crystal "off," AVC "on," Dial Pointer at 900 Band "A." Grid Cap voltages to ground are "zero," except for the two oscillators.

Figure 9—Radiotron Socket Voltages and Trimmer Locations.

movable iron core, adjusted by the heterodyne control provides a variable inductance which acts as a vernier control for adjustment of the oscillator output frequency over the required a-f range on either side of the signal intermediate frequency.

(f) **Tuning.**— The electron-ray tuning tube (RCA-6E5) functions as amplifier and indicator. The indicator section comprises a luminescent screen, cathode and control electrode. The detected signal from the receiver is applied through the amplifier section to the control electrode of the indicator section. This control electrode affects the electron stream emitted from the cathode so that the size of the triangular "shadow" on the luminescent screen is determined by the strength of the incoming signal. The actual strength of the incoming signal may be measured by means of the signal input sensitivity control, which adjusts the variable resistor R-5 (8,000 ohms maximum), from ground to the cathode circuits of r-f and i-f tubes.

(g) **Audio Stage.**— The a-f component selected by the arm of the volume control is amplified in the first audio-frequency tube (RCA-6F5). It is then fed to the output tube (RCA-6F6) by means of a resistance-capacitance coupling. This tube is connected as a pentode for best reception and sensitivity. The plate circuit of same is matched to the voice coil of the electrodynamic loudspeaker through a step-down (output) transformer. *Audio tone control* is effected by means of a three-position switch: (1) In the "bass" position the capacitor C-58 (in the RCA-6F6 control grid circuit) is shorted out, and the capacitor C-62 (across the plate circuit) is grounded. This allows full "lows" and reduces the high-frequency response. (2) In the "music" position capacitor C-58 is still shorted out, maintaining the low-frequency response, but C-62 is not grounded and thus also allows full "highs," and (3) In the "speech" position C-58 is introduced into the circuit reducing "lows" and C-62 still allows full "highs."

The phone jack is connected between the high side of the primary winding and ground of the output transformer.

(h) **Power.**— All power voltages are obtained from a full-wave rectifier and filter system connected to the a-c line. The loudspeaker field coil is excited from this system and serves as a filter reactor.

The power transformer may be either the "Standard" or the "Universal" type, according to particular requirements, dependent on the power supply. Diagrams showing wiring connections and color coding of leads, together with primary and secondary resistances, are given in Figure 8.

(i) **Wave Trap.**—The wave trap in the antenna circuit is designed for suppression of interference and includes suitable capacitance, resistance and inductance with a variable capacitor for readjustment to produce maximum effect on any long wave interference in the vicinity of the i-f frequency.

11. Alignment

This receiver was aligned at the factory but should be checked regularly (preferably once every six months) to insure best possible results. Adjustments, when necessary, can be performed easily since all trimmers and core screws are accessible through openings in the external case as shown in Figure 9. If desired, the chassis can be withdrawn upon removal of the front panel and four mounting screws.

The extensive frequency range of this receiver necessitates a more or less involved method of alignment. However, if the following directions are carefully applied, the normal performance of the instrument will be obtained.

Equipment.—The equipment required for placing this receiver in proper alignment consists of an RCA Cathode Ray Oscillograph, Stock No. 9545, or RCA Output Indicator, Stock No. 4317, an RCA Full Range Oscillator, Stock No. 9595, a Tuning Wand and a Non-metallic screw driver or equivalent equipment. The necessity for alignment of the r-f circuits and the direction of required change may be tested with a Tuning Wand. Its use is as follows:

The Tuning Wand, which consists of a bakelite rod having a small brass cylinder installed at one end, and a core of finely divided iron at the other, may be inserted into a tuned coil to obtain an indication of the tuning. With a signal being supplied to the receiver at the alignment frequency of the circuit concerned, each end of the Wand should be placed through the center of the coil. Holes are provided in the r-f coil shields for this test. A change in tuning will be produced by the presence of the brass cylinder or iron core and consequent change of receiver output occurs. If there is a decrease of output when either of the two ends is inserted, the tuning is correct and will require no adjustment. However, should there be an increase of output due to the iron core and decrease with the brass cylinder, an increase in inductance or capacitance is indicated as necessary to bring the circuit into line. The trimmer involved should therefore be increased accordingly. If the brass cylinder end causes an increase in output, while the iron end causes a decrease, reduction of inductance or capacitance will be necessary to bring the circuit into alignment. This will be equivalent to decreasing the trimmer concerned.

NOTE.—I-F adjustments cannot be made by this method on this receiver.

End of Wand Used	Change of Signal Output	Change Req'd. of Trimmer Capacity
Brass	Decrease	None
Iron	Decrease	
Brass	Increase	Decrease
Iron	Decrease	
Brass	Decrease	Increase
Iron	Increase	

I-F Adjustment.—Six adjustments are associated with the three i-f transformers. Their locations on the chassis are shown by Figures 9 and 10. Each must be aligned to the basic frequency of the crystal filter (approximately 460 kc.). The last i-f

transformer should be adjusted first, the one preceding it next, and the first transformer last. For such adjustments, proceed as follows:

(a) Connect the "Ant." terminal of the Test Oscillator to the RCA 6L7 1st Detector control grid through a .001 mfd. capacitor, and the "Gnd." terminal to chassis ground. Connect the Output Indicator or Cathode-Ray Oscillograph across the loudspeaker voice coil. Adjust the frequency of the Test Oscillator to 460 kilocycles.

(b) Turn AVC "off" and crystal filter "off" then advance the sensitivity control (clockwise) and the volume control (clockwise), to maximum.

(c) Turn the low-frequency tone control to the "speech" position.

(d) Tune the receiver to Band "A", setting the station selector at a point where no interference is received from local stations or from the RCA-6J7 oscillator tube.

(e) Adjust each of the i-f core screws L-22, L-21, L-20, L-19, L-18, and L-17 in sequence for maximum output as indicated on the Output Indicator or Cathode-Ray Oscillograph.

(f) Turn crystal filter "on" and advance selectivity control counter-clockwise to its mid-position "Max."

(g) Change the frequency of the Test Oscillator *very carefully* to obtain maximum output on the Output Indicator or Cathode-Ray Oscillograph. This process will bring the frequency of the Test Oscillator "in step" with the frequency of the crystal filter. The sharpness characteristic due to the crystal filter will be evident in the sudden increase in output to give the maximum value during this tuning operation.

(h) Then adjust each of the i-f core screws *very carefully* for maximum output. Check this alignment with crystal filter "off" for maximum output. The i-f amplifier is now aligned for maximum sensitivity and selectivity; also to the frequency of the crystal filter.

R-F Adjustments.—Connect the Oscillator output to the antenna and ground terminals of the receiver. Keep the Output Indicator or Cathode-Ray Oscillograph attached to the receiver output as above. For each adjustment, use the minimum signal which will give a perceptible indication on the output device. It may be necessary to reduce the signal input (sensitivity) control slightly due to the high degree of sensitivity of the receiver.

Band "A" (a)—Set the range switch of the receiver to its band "A" position and tune the station selector to a dial reading of 1,400 kc. Tune the Test Oscillator to 1,400 kc. and adjust trimmers C-27, C-15, and C-4 in sequence to produce maximum indicated receiver output.

(b) Shift the Oscillator to 540 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then adjust trimmer C-26, simultaneously rocking the tuning control backward and forward through the signal, until maximum output is obtained from the combined operations. Repeat the alignment of C-27, C-15, and C-4 as in (a) to correct for any change caused by the adjustment of C-26.

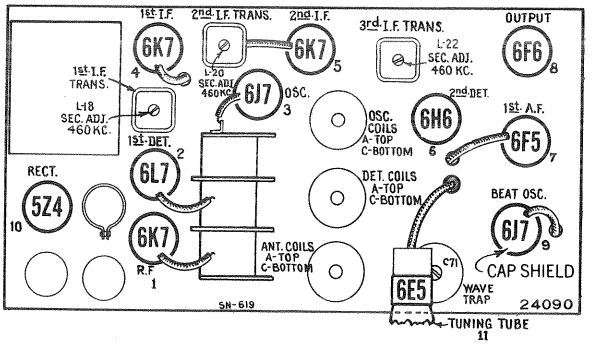


Figure 10—Radiotron and Coil Locations.

Band "B"—Place the receiver range switch in its Band "B" position and tune the station selector to a dial reading of 6,000 kc. Set the frequency of the Test Oscillator to 6,000 kc. Then adjust trimmer C-25 to give maximum receiver output. Two positions may be found which fulfill this condition. The one of least capacitance is correct. To assure that the right peak has been used, tune the *receiver* to 5,080 kc. and increase the Test Oscillator output. The "image" of the 6,000 kc. Test Oscillator signal will be received at this point if C-25 has been adjusted to the proper point of maximum output. *No trimmer adjustments are to be made during this check.* Return the receiver tuning to 6,000 kc., readjust C-25 if necessary, and then adjust the detector and antenna coil trimmers C-12 and C-3 to produce maximum (peak) receiver output as indicated on the output device.

Band "C"—Turn the receiver range selector to its Band "C" position, and set the tuning control to a dial reading of 15,000 kc. Tune the Oscillator to 15,000 kc. Adjust the oscillator parallel trimmer C-23 to produce maximum receiver output. Two positions of the trimmer will be found which fulfill such a condition. The one of least capacitance is correct. To assure that the right position has been used, check for the "image" of the 15,000 kc. signal which will be received at a receiver dial setting of 14,080 kc. if C-23 is correctly adjusted. An increase in Oscillator output may be necessary. No trimmer adjustments should be made during this check. Return the receiver tuning to 15,000 kc., readjust C-23 if necessary, and then adjust the detector and antenna trimmers C-10 and C-1 to give maximum receiver output.

12. Heterodyne Control Setting

Connect a source of unmodulated carrier of the i-f frequency from the grid of the RCA-6L7 first detector to ground. Turn AVC "off," tone control to "speech" position, crystal filter to maximum selectivity, sensitivity control to maximum, audio volume control partially "on," and beat-oscillator "on."

Rotate the heterodyne control knob to left or right until the heterodyne beat is heard.

Change the frequency of the unmodulated carrier from the Test Oscillator *very carefully* for maximum deflection on the Electron-Ray-Tube indicator. Reduce the signal input if necessary so that the Electron-Ray-Tube does not completely close. The test oscillator is now adjusted to the same frequency as the crystal filter.

Set the heterodyne control knob at its zero position and note whether the heterodyne beat is at zero frequency. If not, proceed as follows:

(a) Rotate the heterodyne control knob to obtain zero beat.

(b) Loosen the knob set screw and turn loosened knob on shaft to its "0" or vertical position.

(c) Tighten up set screw.

The heterodyne control is now adjusted to zero beat at the frequency of the crystal filter.

In the event that the frequency drift is such that the zero beat position of the knob is at or beyond the figure "2" on either side, or outside field of rotation, the following adjustment is necessary:

(a) Turn knob until the set-screw-stop on the knob control shaft, behind the front panel, is approximately vertical, then loosen stop with screw driver.

(b) Turn core stud to obtain zero beat. Use a pair of padded long-nose pliers to rotate the core stud in order to avoid injuring thread.

(c) Turn set-screw-stop over to left (facing front panel) to its horizontal mid-position, and adjust knob control shaft to allow 1/32 to 1/16 in. clearance between front panel and adjacent surface of knob.

(d) Tighten set-screw-stop with pliers to grip core stud, then swing stop to vertical and tighten securely with screw driver.

(e) Proceed as first described for setting knob accurately to zero position at zero beat.

NOTE.—Do not pull control shaft loose from bearing bracket when adjusting core stud.

13. Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to ground on Figure 9 will serve to assist in locating causes for faulty operation, when existent. Grid cap voltages to ground are zero, except in the cases of the two oscillators the readings of which are not dependent upon power supply but upon the oscillatory condition. Each value as specified should hold within $\pm 20\%$ when the receiver is normally operative at the rated supply voltage. Variations in excess of this will usually be indicative of trouble in the basic circuits. The voltages given on the diagram are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance is comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1,000 ohms per volt will be satisfactory when the range used for each check is chosen as high as possible consistent with good readability.

14. Wave Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc. during manufacture; however, local conditions may require a readjustment, depending upon the interfering frequency.

SERVICE HINTS

(1) Beat-frequency oscillator instability may occasionally be due to a broken or damaged magnetite core, in which case the Stock No. 12084 coil of improved design with compression spring behind core, should be used.

(2) Image response, or appearance of same station at two points should be corrected by careful alignment in accordance with instructions.

transformer should be adjusted first, the one preceding it next, and the first transformer last. For such adjustments, proceed as follows:

(a) Connect the "Ant." terminal of the Test Oscillator to the RCA 6L7 1st Detector control grid through a .001 mfd. capacitor, and the "Gnd." terminal to chassis ground. Connect the Output Indicator or Cathode-Ray Oscillograph across the loudspeaker voice coil. Adjust the frequency of the Test Oscillator to 460 kilocycles.

(b) Turn AVC "off" and crystal filter "off" then advance the sensitivity control (clockwise) and the volume control (clockwise), to maximum.

(c) Turn the low-frequency tone control to the "speech" position.

(d) Tune the receiver to Band "A", setting the station selector at a point where no interference is received from local stations or from the RCA-6J7 oscillator tube.

(e) Adjust each of the i-f core screws L-22, L-21, L-20, L-19, L-18, and L-17 in sequence for maximum output as indicated on the Output Indicator or Cathode-Ray Oscillograph.

(f) Turn crystal filter "on" and advance selectivity control counter-clockwise to its mid-position "Max."

(g) Change the frequency of the Test Oscillator *very carefully* to obtain maximum output on the Output Indicator or Cathode-Ray Oscillograph. This process will bring the frequency of the Test Oscillator "in step" with the frequency of the crystal filter. The sharpness characteristic due to the crystal filter will be evident in the sudden increase in output to give the maximum value during this tuning operation.

(h) Then adjust each of the i-f core screws *very carefully* for maximum output. Check this alignment with crystal filter "off" for maximum output. The i-f amplifier is now aligned for maximum sensitivity and selectivity; also to the frequency of the crystal filter.

R-F Adjustments.—Connect the Oscillator output to the antenna and ground terminals of the receiver. Keep the Output Indicator or Cathode-Ray Oscillograph attached to the receiver output as above. For each adjustment, use the minimum signal which will give a perceptible indication on the output device. It may be necessary to reduce the signal input (sensitivity) control slightly due to the high degree of sensitivity of the receiver.

Band "A" (a)—Set the range switch of the receiver to its band "A" position and tune the station selector to a dial reading of 1,400 kc. Tune the Test Oscillator to 1,400 kc. and adjust trimmers C-27, C-15, and C-4 in sequence to produce maximum indicated receiver output.

(b) Shift the Oscillator to 540 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. Then adjust trimmer C-26, simultaneously rocking the tuning control backward and forward through the signal, until maximum output is obtained from the combined operations. Repeat the alignment of C-27, C-15, and C-4 as in (a) to correct for any change caused by the adjustment of C-26.

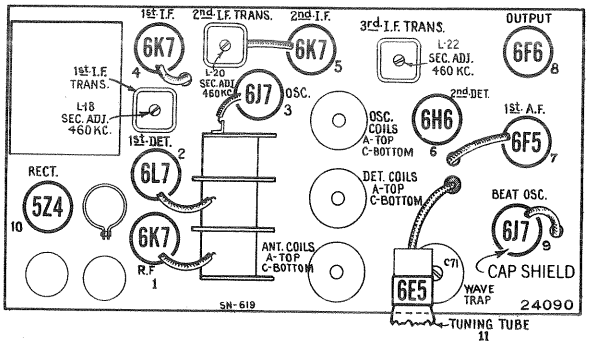


Figure 10—Radiotron and Coil Locations.

Band "B"—Place the receiver range switch in its Band "B" position and tune the station selector to a dial reading of 6,000 kc. Set the frequency of the Test Oscillator to 6,000 kc. Then adjust trimmer C-25 to give maximum receiver output. Two positions may be found which fulfill this condition. The one of least capacitance is correct. To assure that the right peak has been used, tune the *receiver* to 5,080 kc. and increase the Test Oscillator output. The "image" of the 6,000 kc. Test Oscillator signal will be received at this point if C-25 has been adjusted to the proper point of maximum output. *No trimmer adjustments are to be made during this check.* Return the receiver tuning to 6,000 kc., readjust C-25 if necessary, and then adjust the detector and antenna coil trimmers C-12 and C-3 to produce maximum (peak) receiver output as indicated on the output device.

Band "C"—Turn the receiver range selector to its Band "C" position, and set the tuning control to a dial reading of 15,000 kc. Tune the Oscillator to 15,000 kc. Adjust the oscillator parallel trimmer C-23 to produce maximum receiver output. Two positions of the trimmer will be found which fulfill such a condition. The one of least capacitance is correct. To assure that the right position has been used, check for the "image" of the 15,000 kc. signal which will be received at a receiver dial setting of 14,080 kc. if C-23 is correctly adjusted. An increase in Oscillator output may be necessary. No trimmer adjustments should be made during this check. Return the receiver tuning to 15,000 kc., readjust C-23 if necessary, and then adjust the detector and antenna trimmers C-10 and C-1 to give maximum receiver output.

12. Heterodyne Control Setting

Connect a source of unmodulated carrier of the i-f frequency from the grid of the RCA-6L7 first detector to ground. Turn AVC "off," tone control to "speech" position, crystal filter to maximum selectivity, sensitivity control to maximum, audio volume control partially "on," and beat-oscillator "on."

Rotate the heterodyne control knob to left or right until the heterodyne beat is heard.

Change the frequency of the unmodulated carrier from the Test Oscillator *very carefully* for maximum deflection on the Electron-Ray-Tube indicator. Reduce the signal input if necessary so that the Electron-Ray-Tube does not completely close. The test oscillator is now adjusted to the same frequency as the crystal filter.

Set the heterodyne control knob at its zero position and note whether the heterodyne beat is at zero frequency. If not, proceed as follows:

(a) Rotate the heterodyne control knob to obtain zero beat.

(b) Loosen the knob set screw and turn loosened knob on shaft to its "0" or vertical position.

(c) Tighten up set screw.

The heterodyne control is now adjusted to zero beat at the frequency of the crystal filter.

In the event that the frequency drift is such that the zero beat position of the knob is at or beyond the figure "2" on either side, or outside field of rotation, the following adjustment is necessary:

(a) Turn knob until the set-screw-stop on the knob control shaft, behind the front panel, is approximately vertical, then loosen stop with screw driver.

(b) Turn core stud to obtain zero beat. Use a pair of padded long-nose pliers to rotate the core stud in order to avoid injuring thread.

(c) Turn set-screw-stop over to left (facing front panel) to its horizontal mid-position, and adjust knob control shaft to allow 1/32 to 1/16 in. clearance between front panel and adjacent surface of knob.

(d) Tighten set-screw-stop with pliers to grip core stud, then swing stop to vertical and tighten securely with screw driver.

(e) Proceed as first described for setting knob accurately to zero position at zero beat.

NOTE.—Do not pull control shaft loose from bearing bracket when adjusting core stud.

13. Radiotron Socket Voltages

The voltage values indicated from the Radiotron socket contacts to ground on Figure 9 will serve to assist in locating causes for faulty operation, when existent. Grid cap voltages to ground are zero, except in the cases of the two oscillators the readings of which are not dependent upon power supply but upon the oscillatory condition. Each value as specified should hold within $\pm 20\%$ when the receiver is normally operative at the rated supply voltage. Variations in excess of this will usually be indicative of trouble in the basic circuits. The voltages given on the diagram are actual operating values and do not allow for inaccuracies which may be caused by the loading effect of a voltmeter's internal resistance. This resistance should be duly considered for all readings. The amount of circuit resistance shunting the meter during measurement will determine the accuracy to be obtained, the error increasing as the meter resistance is comparable to or less than the circuit resistance. For the majority of readings, a meter having an internal resistance of 1,000 ohms per volt will be satisfactory when the range used for each check is chosen as high as possible consistent with good readability.

14. Wave Trap Adjustment

With the receiver in operation using its normal antenna, tune station selector to the point at which the intermediate frequency interference is most intense. Then adjust the wave trap trimmer to the point which causes maximum suppression of the interference. This trimmer is adjusted to 460 kc. during manufacture; however, local conditions may require a readjustment, depending upon the interfering frequency.

SERVICE HINTS

(1) Beat-frequency oscillator instability may occasionally be due to a broken or damaged magnetite core, in which case the Stock No. 12084 coil of improved design with compression spring behind core, should be used.

(2) Image response, or appearance of same station at two points should be corrected by careful alignment in accordance with instructions.

PART V—REPLACEMENT

Stock No.	Description	List Price
	RECEIVER ASSEMBLIES	
5237	Bushing—Variable tuning condensor mounting bushing assembly—Package of 3	.43
12115	Cable—6-conductor braided reproducer cable approximately 75-in. long—Complete with 6-contact female connector, Stock No. 11934	1.55
11350	Cap—Grid contact cap—Package of 5	.20
11223	Capacitor—Adjustable capacitor (C26)	.46
12077	Capacitor—5 Mmfd. (C52)	.42
11941	Capacitor—22 Mmfd. (C19)	.22
11321	Capacitor—33 Mmfd. (C9)	.26
11289	Capacitor—50 Mmfd. (C13, C28)	.26
11291	Capacitor—115 Mmfd. (C29, C30, C32)	.24
8076	Capacitor—115 Mmfd. (located in beat-oscillator coil, Stock No. 12084) (C54)	.20
11998	Capacitor—115 Mmfd. (C41, C42, C46, C47)	.28
5116	Capacitor—175 Mmfd. (C59)	.18
11500	Capacitor—175 Mmfd. (C48)	.18
11290	Capacitor—400 Mmfd. (C20, C57, C68)	.25
12086	Capacitor—400 Mmfd. Located in beat-oscillator coil Stock No. 12084 (C55)	.25
12104	Capacitor—560 Mmfd. (C33)	.24
11633	Capacitor—900 Mmfd. (C58)	.32
11939	Capacitor—1200 Mmfd. (C34, C35)	.42
12571	Capacitor—1225 Mmfd. (C24)	.20
11287	Capacitor—4500 Mmfd. (C21, C73)	.30
4838	Capacitor—.005 Mfd. (C69)	.20
4868	Capacitor—.005 Mfd. (C63)	.20
11938	Capacitor—.006 Mfd. (C72)	.32
4858	Capacitor—.01 Mfd. (C38, C51, C53, C56, C61)	.25
4624	Capacitor—.01 Mfd. (C49)	.54
11451	Capacitor—.017 Mfd. (C62)	.18
4836	Capacitor—.05 Mfd. (C6, C7, C16, C50)	.30
4886	Capacitor—.05 Mfd. (C14, C37, C44)	.20
5170	Capacitor—0.25 Mfd. (C60, C64)	.25
4841	Capacitor—0.1 Mfd. (C18, C39, C43)	.22
4839	Capacitor—0.1 Mfd. (C8, C45)	.28
11248	Capacitor—4 Mfd. (C65)	1.06
11203	Capacitor—10 Mfd. (C67)	1.18
5212	Capacitor—18 Mfd. (C66)	1.16
12092	Coil—Antenna coil—"A" and "C" bands (L1, L2, L5, L6, C1, C2, C4)	2.24
12098	Coil—Antenna coil—"B" band (L3, L4, C3)	.82
12084	Coil—Beat frequency oscillator coil (L23, C54, C55, R24)	1.70
12093	Coil—Detector coil—"A" and "C" bands (L7, L8, L11, L12, C10, C11, C15)	2.34
12099	Coil—Detector coil—"B" band (L9, L10, C12)	.88
12094	Coil—Oscillator coil—"A" and "C" bands (L14, L16, C22, C23, C27)	2.14
12100	Coil—Oscillator coil—"B" band (L15, C25)	.82
5221	Coil—Oscillator coil—"D" band (L13)	.64
11214	Condenser—3-gang variable tuning condenser (C5, C17, C31)	4.20
12089	Condenser—Crystal switch and phasing control condenser—Less extension shaft (S11, C36)	1.25
11934	Connector—6-contact female connector for reproducer cable, Stock No. 12115	.38
12006	Core—Adjustable core for I.F. transformer, Stock Nos. 12095, 12096 or 12097	.22
12085	Core—Adjustable core and stud assembly—For beat-oscillator coil, Stock No. 12084.	.16
12107	Coupling—Extension shaft coupling for Stock No. 12089 phasing control	Price on application
12108	Crystal—Crystal filter and case	14.00
11246	Foot—Chassis foot and bracket—Package of 2	.76
8041	Plate—I.F. or R.F. coil shield locking plate—Package of 2	.12
11244	Resistor—Voltage divider resistor, comprising one 7,500-ohm and one 9,200-ohm section (R32, R33)	1.08
12102	Resistor—Voltage divider resistor, comprising one section of 160-ohm and one section 110-ohm (R34. R35)	.44
11937	Resistor—2.5 ohms—wire wound (R37)	1.12
12432	Resistor—45 ohms—Flexible type (R40, R41)—For use only in models with 110-220-volt power transformer—Package of 5	.60
11932	Resistor—330 ohms—carbon type, 1/10-watt (R14, R15)—Package of 5	.75
11296	Resistor—330 ohms—carbon type, ¼-watt (R2)—Package of 5	1.00
5165	Resistor—820 ohms—carbon type, ¼ watt (R6)—Package of 5	1.00
11935	Resistor—1,000 ohms—carbon type, 1/10-watt (R10)—Package of 5	.75
5112	Resistor—1,000 ohms—carbon type, ¼-watt (R3, R16)—Package of 5	1.00
3381	Resistor—10,000 ohms—carbon type, ¼-watt (R21, R26)—Package of 5	1.00
8070	Resistor—22,000 ohms—carbon type, ½-watt (R11)—Package of 5	1.00
11300	Resistor—33,000 ohms—carbon type, 1/10-watt (R8)—Package of 5	.75
8067	Resistor—39,000 ohms—carbon type, ½-watt (R9)—Package of 5	1.00
11646	Resistor—47,000 ohms—carbon type, ¼-watt (R25)—Package of 5	1.00
11282	Resistor—56,000 ohms—carbon type, 1/10-watt (R7, R18)—Package of 5	.75
5029	Resistor—56,000 ohms—carbon type, ¼-watt (R30)—Package of 5	1.00
8064	Resistor—82,000 ohms—carbon type, ½-watt (R36)—Package of 5	1.00
3118	Resistor—100,000 ohms—carbon type, ¼-watt (R1, R4, R12, R13, R17)—Package of 5	1.00
11281	Resistor—100,000 ohms—carbon type, 1/10-watt (R24)—Package of 5	.75
11323	Resistor—270,000 ohms—carbon type, ¼-watt (R29)—Package of 5	1.00
11172	Resistor—470,000 ohms—carbon type, ¼-watt (R31)—Package of 5	1.00
11452	Resistor—470,000 ohms—carbon type, 1/10-watt (R19)—Package of 5	.75
12013	Resistor—1 Megohm—carbon type, 1/10-watt (R38)—Package of 5	.75
3033	Resistor—1 Megohm—carbon type, ¼-watt (R20)—Package of 5	1.00
11626	Resistor—2.2 Megohm—carbon type, ¼-watt (R22)—Package of 5	1.00
11936	Resistor—4.7 Megohm—carbon type—¼-watt (R23)—Package of 5	1.00
12090	Sensitivity Control (R5)	1.22
4669	Screw—8-32 x 5/32-in. set screw for extension shaft, Stock No. 12105—Package of 10	.25
12103	Shaft—Extension shaft for phasing control, Stock No. 12089	.15
12105	Shaft—Extension shaft for beat-oscillator coil adjustment	.15

The prices quoted above are subject to change without notice

PART V—Continued

Stock No.	Description	List Price
5249	Shield—Antenna, detector or oscillator coil shield	.20
12112	Shield—First or third I.F. transformer shield	.28
12111	Shield—Second I.F. transformer shield	.28
12110	Shield—Top cap shield for Radiotron 6J7 beat-oscillator	.14
11195	Socket—5-contact 5Z4 Radiotron socket	.15
11313	Socket—5-contact 6F5 Radiotron socket	.18
11198	Socket—7-contact 6L7, 6F6, 6H6 second I.F. or R.F. 6K7 Radiotron socket	.15
12113	Socket—7-contact 6J7 beat-oscillator Radiotron socket	.16
12114	Socket—7-contact 6J7 oscillator Radiotron socket	.16
11196	Socket—8-contact first I.F. 6K7 Radiotron socket	.15
11381	Socket—Tuning tube socket and cover	.45
12106	Spring—Retaining spring for beat-oscillator shaft, Stock No. 12105—Package of 5	.15
12374	Switch—Beat-frequency oscillator switch (S14)	.55
12109	Switch—Automatic volume control switch (S10)	.30
12088	Switch—Combination power, tone and stand-by switch (S13, S15, S16)	1.00
12091	Switch—Range switch (S1, S2, S3, S4, S5, S6, S7, S8, S9)	3.55
5238	Terminal—Antenna terminal board and clip	.14
12095	Transformer—First intermediate frequency transformer (L17, L18, C33)	1.50
12101	Transformer—Power transformer, 105-125 volts, 25-60 cycle (T1)	5.20
12331	Transformer—Power transformer, 105-130, 140-160, 195-250 volts, 50-60 cycle	5.15
12096	Transformer—Second intermediate frequency transformer (L19, L20, C41, C42)	1.85
12097	Transformer—Third intermediate frequency transformer (L21, L22, C46, C47, C48, R18, R19)	2.52
11649	Trap—Wave-trap (L27, C70, R39)	1.15
12087	Volume Control (R27)	1.84
	DRIVE ASSEMBLIES	
11952	Dial—Station selector dial scale	.78
12116	Drive—Variable tuning condenser drive assembly—Comprising reflector, bracket, drive, hub and gear assembled	1.35
11982	Fastener—Station selector dial scale fastener—Package of 25	.42
4827	Gear—Spring gear assembly for vernier pointers	1.25
11228	Gear—Vernier pointer drive gear	.42
11303	Indicator—Station selector vernier indicator pointer	.22
4520	Indicator—Station selector indicator pointer	.18
4340	Lamp—Dial lamp—Package of 5	.60
12577	Screw—8-32 x 1¼ in. slotted set screw for drive assembly—Package of 10	.15
12117	Shaft—Dual speed drive shaft for variable condenser drive assembly — Comprising shaft, drive, spool, spring and washer—assembled	.36
11222	Socket—Dial lamp socket	.18
	MISCELLANEOUS ASSEMBLIES	
11192	Clamp—Tuning tube mounting clamp	.12
12122	Escutcheon—Station selector escutcheon	.60
12130	Foot—Rubber foot assembly—Package of 4.	.25
6614	Glass—Station selector dial glass	.30
12128	Jack—Telephone jack (J1)	1.02
12124	Knob—Heterodyne adjustment or selectivity control knob—Package of 5	.70
12123	Knob—Power (Tone), signal input, AVC, range, volume or beat-oscillator control knob—Package of 5	.70
12129	Knob—Station selector knob assembly—Comprising 1 main and 1 vernier tuning knob—Package of 5	2.10
4340	Lamp—Pilot lamp—Package of 5	.60
12120	Panel—Control panel	1.68
12121	Panel—Front panel assembly, complete	5.45
4678	Ring—Spring ring for station selector dial glass—Package of 5	.34
12127	Screw—Chassis mounting screw assembly—Package of 4	.18
12126	Screw—6-32 x ⅜-in. fillister head screw—Used to hold front panel—Package of 10.	.42
12125	Screw—8-32 x 5/16-in. cupped point set screw for knob, Stock No. 12124—Package of 10	.20
4982	Spring—Retaining spring for main tuning knob in Stock No. 12129—Package of 10.	.26
11349	Spring—Retaining spring for knob, Stock No. 12123—Package of 5	.15
11222	Socket—Pilot lamp socket	.18
	REPRODUCER ASSEMBLIES	
11954	Board—Terminal board assembly, with eyelets and lead wire clips	.14
11231	Bolt—Yoke and core assembly bolt and nut	.16
8060	Bracket—Output transformer mounting bracket	.14
11257	Clamp—Cone center suspension clamping nut and screw assembly—Package of 5	.25
11254	Coil—Field coil (L26)	2.00
11233	Coil—Neutralizing coil (L24)	.30
11235	Cone—Reproducer cone (L25)—Package of 5	3.50
11953	Connector—6-contact male connector for reproducer	.28
9658	Reproducer complete—Less baffle assembly	6.16
11253	Transformer—Output transformer (T2)	1.56
11886	Washer—Spring washer—Used to hold field coil securely—Package of 5	.20

The prices quoted above are subject to change without notice