Hudson-RCA Victor
Model CB-6

SIX-TUBE, DE LUXE AUTOMOBILE RECEIVER

SERVICE NOTES

Manufactured By

RCA VICTOR DIVISION

RCA Manufacturing Company, Inc.

Camden, N. J., U. S. A.

For

Hudson Motor Car Company

DETROIT, MICH., U. S. A.

Radio Kit—1936—Hudson and Terraplane

MODEL CB-6

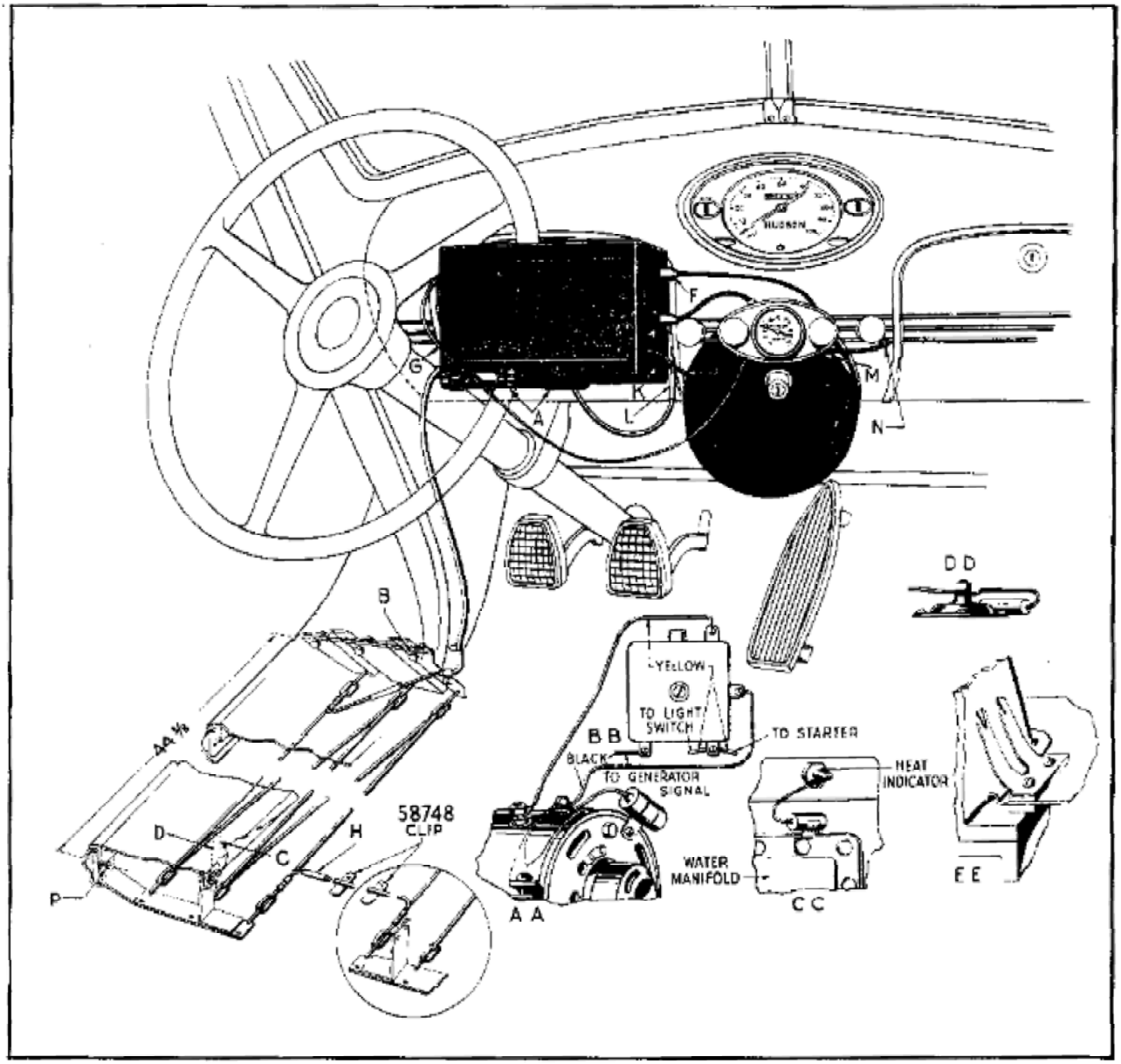

Figure A—Mounting Details and Connections

The Radio Kit, Part No. 152018 Includes:—

1—Receiver Complete
1—Speaker Complete
1—Control Head complete with cables
1—Pilot Light Bulb
1—Feed Cable Assembly and Fuse
1—Aerial Assembly and Brackets
1—Aerial Lead In with shield and clip
1—Distributor Suppressor
2—Small Condensers (one required on Terraplane Deluxe Models)
1—Large Condenser
1—Ground Strap
3—Ground Forks
Bolts, Nuts, Screws and Lock Washers for mounting units

In order to complete the installation on Terraplane Deluxe Models, a Charge Control (Part No. 47979) is required in addition to the Radio Kit.

HUDSON-RCA VICTOR MODEL CB-6

Six-Tube, DeLuxe, Superheterodyne, Automobile Receiver

SERVICE NOTES

Electrical Specifications

TUBE COMPLEMENT

(1) RCA-6D6.....Radio Frequency Amplifier
(2) RCA-6A7.....Oscillator and First Detector
(3) RCA-6D6.....Intermediate Amplifier
(4) RCA-85...Detector, A-F Amplifier, and A.V.C.
(5) RCA-6C5..... Driver
(6) RCA-6A6.....Power Output Amplifier

TUNING RANGE .....540 kc. to 1600 kc.

OUTPUT RATING

Maximum .....9.0 Watts
Undistorted .....6.0 Watts

LOUDSPEAKER

Type .....Electrodynamic
Impedance (v.c.) .....3.0 ohms at 400 cycles

POWER RATING

Supply Voltage .....6.3 Volts (Storage Battery)
Current Drain .....7.6 Amperes at 6.3 Volts
Fuse Protection .....15 Amperes

PILOT LAMP .....Mazda No. 51, 7.5 Volts

ALIGNMENT FREQUENCIES

I-F Transformers .....260 kc.
Oscillator Coil.....600 kc. and 1400 kc.
Detector Coil .....1400 kc.
Antenna Coil .....1400 kc.

Mechanical Specifications

RECEIVER UNIT

Height ..... 6⅞ Inches
Width .....10⅛ Inches
Depth ..... 7⅜ Inches
Mounting .....⅜ Inch Cap Screws (two)

SPEAKER UNIT

Diameter .....8¾ Inches
Depth .....5 Inches
Cone Diameter .....8 Inches
Mounting .....⅜ Inch Stud (one)

OPERATING CONTROLS

(1) Operating Switch—Volume Control (2) Tuning Control (3) High-Frequency Tone Control

TUNING DRIVE RATIO .....12 to 1

WEIGHT

Receiver, Speaker and Accessories Complete .....30 Pounds
Complete Equipment Packed for Shipment .....34 Pounds

General Description

This instrument consists of a separated three-unit assembly which includes: (1) a six-tube chassis with self-contained power conversion system; (2) an electrodynamic loudspeaker; and (3) an operating control head.

The receiver is compactly housed in a substantial metal case. There are removable covers to permit ready access to the under and top sides of the chassis. Two mounting studs are used for supporting this unit to the steering column bracket on the car.

The loudspeaker mechanism is encased in a cylindrical metal housing. Field and voice coil connections from this unit to the receiver are by means of a shielded cable. A single support stud is attached at the rear of the speaker case for mounting purposes.

The main operating controls are located on the remote control unit, which mounts on instrument panel of the car. A subordinate high-frequency tone control is mounted on the receiver case. Flexible shafts interconnect the remote control knobs and the controlled devices within the receiver housing.

Radio Installation-Operation

1—Lift floor mat and install three ground forks (Part No. 151210) to front, rear and left of floor board opening so that spring fingers contact transmission control housing. (See Insert EE.) The paint must be removed from the floor panel and transmission tower to provide good electrical contact. A spacer (Part No. 151435) should be placed under each ground fork and the parts secured to the floor board with six screws (Part No. 71648) and three tapping plates (Part No. 151436).

2—Remove finish plate from center of instrument panel—attached with studs and nuts on back of panel.

3—Put the Radio Receiver in place on top of the steering column support bracket with the control shaft connections E and F on the right, and secure with two cap screws "A." On right-hand drive models, the receiver is mounted with the control shaft connections to the left.

4—Punch a hole through the front dash pad, using the 3/8" hole located just above the center of the dash reinforcement ribs as a guide.

5—Place wooden spacer on speaker mounting stud and insert stud through hole in dash and dash pad, securing with a washer and nut on the engine side of dash.

6—Remove the control knobs from the control head, and also the nuts located behind the knobs. Insert control head from back of panel, securing by replacing nuts, and then replace control knobs.

7—Insert the driving tongue of the control cable from the right (tuning) knob into the upper socket F and tighten nut. Insert the driving tongue of the control cable from the lower (volume) knob into the socket and tighten nut. NOTE: On right-hand drive installations the long control cable should be attached to the volume (left) control knob.

8—Insert speaker lead plug "J" into case.

9—Attach wire G to socket at left end of case.

10—Attach feed wire to Battery Terminal of the lighting switch "N" and connect to socket "M," to the back of the control head, being sure that fuse is in place in socket.

11—Remove the three running board to front fender bolt nuts and install front antenna bracket on front of running board and fender flange.

12—Measure 44 3/8" from front bracket along running board moulding reinforcement and punch mark 1/4" from bottom of reinforcement. Drill 3/16" hole and tap 1/4-20.

13—Measure 43 1/8" (B to C) from front bracket along running board inner flange and drill a 5/32" hole through the running board and dust apron flanges—1/2" above the bottom. Drill another 5/32" hole (D) 1 1/4" to the rear of the first.

14—Repeat operations 11-12-13 on opposite running board and mount rear antenna brackets.

15—Mount the right-hand antenna, starting at the inner hole of the rear bracket with the hook near the long lead, which goes across the car, attaching all hooks in order and stretching to insert last hook in outer hole of front bracket.

16—Mount the left-hand antenna starting at the inner hole of the rear bracket with the end opposite the lead-in, working back and forth and stretching to attach the last hook to the outer hole of the front bracket.

17—Connect the right- and left-hand antennas with a bolt and nut (H) with the lead passing over the propeller shaft. Cover the connection with rubber cement and rubber tape. Secure cross lead to bottom body panel with two No. 58748 clips and drive screws to hold it away from the propeller shaft.

18—Insert the lead-in through the hole in body floor panel in line with left front door, front pillar post, leading up behind kick panel behind radio receiver and connect to socket "L." Secure lead-in to front bracket with the bolt and nut.

19—Attach one small condenser on gasoline tank gauge unit with one unit mounting screw, attaching condenser terminal to gauge unit terminal. (Insert "DD.")

20—Attach one small condenser to upper rear cap screw in engine water manifold and attach condenser terminal to terminal of water temperature gauge element. (Insert "CC.") NOTE: This condenser not required on Terraplane Deluxe models unless Accessory Temperature Gauge is installed.

21—Attach large condenser to cap screw at rear of generator and connect condenser terminal to generator "A" terminal. (Insert "AA.")

22—Install 48763 ground strap from the front muffler bracket to chassis frame. The paint must be removed from points of attachment to insure good electrical contact.

23—Install suppressor in central terminal of distributor.

24—When installing radio on Terraplane Deluxe models with air-cooled generator, mount generator charge regulator in place of relay with two screws to two threaded holes in cowl side panel provided for the purpose. Fuse cap should be on upper face. Remove ground cup from generator "F" terminal. See illustration inserts for wiring diagram. Connect "FLD" terminal on side of charge regulator to "F" terminal (engine side) of generator. Adjust generator output to 22 amps., cold—17 amps., warm.

25—Turn on volume and tune set to a known local station. Adjust the dial hand to give correct dial reading by turning knurled knob on back of control head.

CIRCUIT ARRANGEMENT

The schematic and wiring layouts of the electrical circuit are shown in Figures 2 and 3, respectively. From these diagrams it may be seen that six Radiotrons are incorporated in the basic superheterodyne circuit. In sequence, there is an r-f stage, a dual first detector-oscillator stage, a single i-f stage, a second detector-audio amplifier-a.v.c. stage, a driver stage, and a class "B" output stage. The power supply system contains a mechanical interrupter and rectifier. The following circuit features are of particular importance:

Noise Filter—Reduction of ignition interference and similar disturbances are brought about by filter arrangements in the antenna input circuit and the "A" battery input lead. This antenna filter, L-1, C-1, and C-2, is a "low-pass" type, having an acceptance band below 1600 kc. The inductance L-2 is for the purpose of shunting out power line hum pickup.

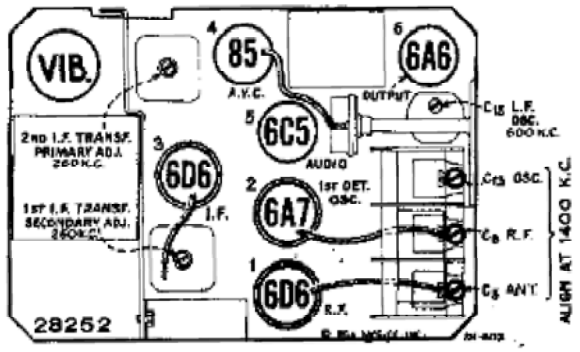

Figure 1—Radiotron Locations

Tuned Circuits—There are seven resonant circuits in the radio frequency end of the receiver. The r-f, first dectector, and oscillator grid circuits are tuned by a three-gang tuning condenser. The remaining tuned circuits consist of the primary and secondary windings of the i-f transformers, which resonate with fixed condensers and are tuned by adjustable iron cores to a nominal frequency of 260 kilocycles.

Detection—Detection takes place as a result of the rectifying action of one of the diodes of the RCA-85 tube, the current being developed through resistors R-20 and R-21. The audio component of this current is coupled through capacitor C-23 to the one megohm volume control R-9. The arm of this volume control is connected to the grid of the RCA-85 tube, thus giving a means of continuously varying the voltage input to the audio amplifier.

A.V.C.—The a.v.c. diode of the RCA-85 tube is coupled through capacitor C-25 to the primary of the second i-f transformer. Due to the rectifying action of this diode, a current is developed through resistor R-13. The d-c voltage drop in this resistor is used for automatically regulating the control grid bias of the r-f, first detector, and i-f stages, the voltage being applied through a suitable filter network. Due to the fact that the a.v.c. diode returns through resistor R-13 to a point which is 15 volts negative with respect to its cathode, the a.v.c. action is delayed until the input signal reaches a predetermined level. This gives more uniform output for widely varying signal strengths into the antenna.

Audio System—As mentioned under "Detection", the audio component of the detected signal is selected from the manual volume control and applied to the control grid of the RCA-85 tube. The plate circuit of this tube is connected through capacitor C-27 to the control grid of the driver tube, an RCA-6C5. The plate circuit of the driver tube is coupled through the driver transformer T-1 to the control grids of the class "B" output tube, RCA-6A6. This tube is coupled through the output transformer T-2 to the loudspeaker.

SERVICE DATA

Regular maintenance will assure proper operation of this receiver over an extensive period of life. It should, therefore, receive the same routine inspections and adjustments as are accorded the mechanical and electrical systems of the car. The following service information suggests procedure to be applied in locating and repairing faults which may develop and affect the operation of the receiver.

Defects External To Receiver

Interference—Failure or disconnection of spark-suppressing capacitors at gas gauge, temperature indicator, and generator will allow the ignition interference produced at such points to be radiated and picked up by the receiver. Defects in the ignition system not only affect operation of the car, but will produce radio interference as well. The system should, therefore, be thoroughly checked and repaired if necessary. The three pairs of bonding fingers attached to the floor boards which contact the transmission control cover, and the bonding strap from muffler front bracket to chassis frame side member for noise reduction, may develop loose connections and cause intermittent noise level in the receiver. In checking the receiver for noisy operation, it is also wise to make sure that interference is not being caused by disturbing electrical devices which are not part of, but are in vicinity of, the car.

Battery—Corroded terminals at the storage battery will usually result in low voltage at the receiver and consequent low sensitivity. Noise may also be generated by this condition. Battery conditions will be reflected in the motor operation as well as that of the radio.

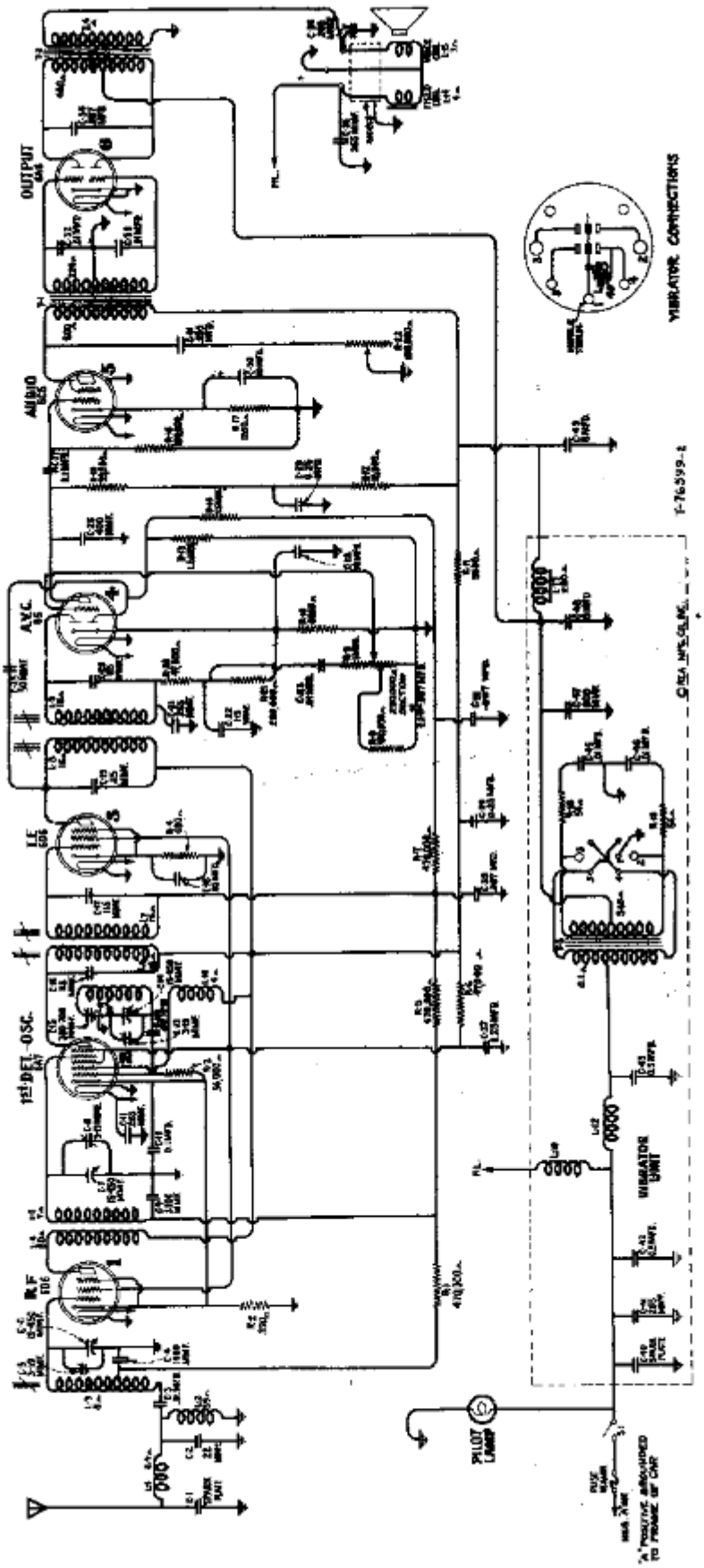

Figure 2—Schematic Circuit Diagram

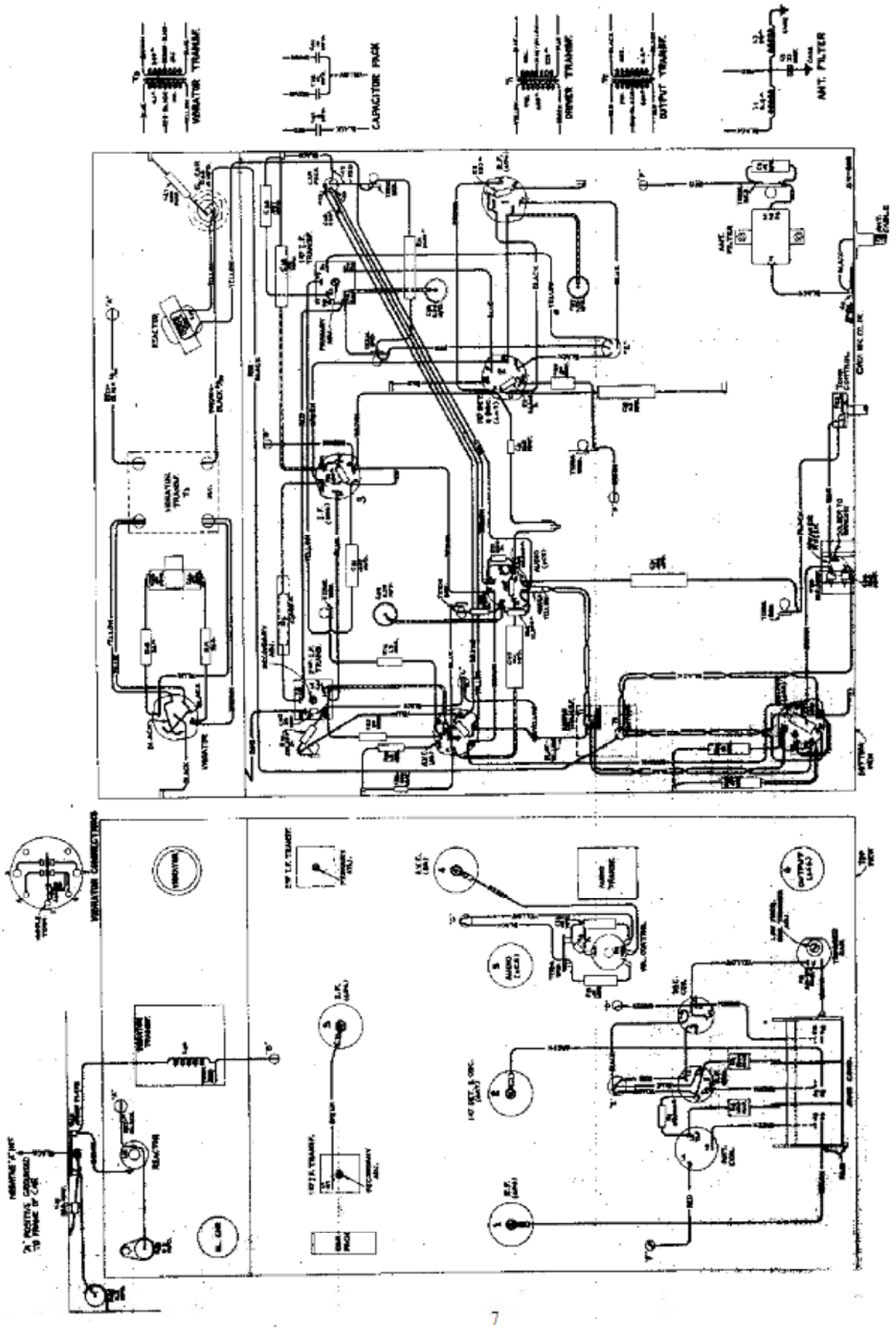

Figure 3—Chassis Wiring Diagram

Antenna—Vibration may occasionally cause the antenna connections to become loose or broken. These should be carefully checked and repaired, if necessary. Corrosion due to weather is also deleterious at these points. Each connection should be thoroughly cleaned, to assure solid contact at all times. The grounding point of the antenna lead shield is at the front, left, running board bracket. This point of connection should not be changed, since its position on the car is very critical in regard to interference. The ground connection to the case of the receiver should be kept in secure connection to the frame of the car at all times; if loose, it may cause intermittent operation of the receiver, loss of sensitivity, or will produce noisy reception.

Defects Within Receiver

Total Inoperation—Failure to operate may be due to one or more causes. When a receiver is found in such condition, its parts should be checked as follows:

(a) FUSE—May be burned out or making poor contact. In case of burnout, replace with a fuse of equivalent rating. If second fuse fails, remove receiver from car and investigate condition of interrupter and receiver circuits.

(b) TUBES—Dismount the receiver and remove top cover. Check to see that all tubes are correctly placed in their proper sockets. One or more tubes may be defective. To determine their condition, remove them from the receiver and test with standard tube-testing equipment. If such equipment is unavailable, substitute the tubes with others known to be in good condition. It is not advisable to test the tubes while in the receiver, due to measurement errors which would result from the associated circuits.

(c) INTERRUPTER—Improper operation of the power supply interrupter is usually evidenced by reception of "sputtering noise." To check, remove the antenna connection and advance the receiver volume control (engine off). An increase in noise will usually indicate that the interrupter is in poor condition. Further investigation should be made by substitution of the interrupter with one known to be in good condition. No adjustments should be attempted on this unit. The operation of the interrupter and the associated rectifier system may also be proved normal by measurement of the filter output voltage, which should read steady at approximately 275 volts (d-c). The points of test are indicated by Figure 6.

(d) CIRCUIT—Failures within the basic circuits of the receiver may be isolated by a systematic test procedure. The receiver and speaker should be removed from the car and placed where they will be readily accessible. Covers of the top and bottom of the receiver housing should be removed. Continuity tests should be made to ascertain the condition of the speaker voice coil and field circuits as well as that of the cable interconnecting the receiver and speaker. Battery voltage should then be applied to the equipment, the operating switch turned to "On" and voltage measurements made at the receiver circuits to determine whether or not the power system is functioning properly. If no voltage or incorrect voltage is indicated at the filter output, individual tests should be made on the "A-Hot" wiring, power transformer, interrupter, and filter reactor to locate the defective part. If proper voltage is indicated at the filter output, then a thorough voltage analysis of the receiver circuit is in order. Figure 6 gives the values which should be obtained on a receiver in normal operating condition. Deviations from the specified values may be as much as ± 20% before the operation of the receiver is appreciably affected. The absence or erratic reading of one or more of the voltages will indicate a fault in the particular circuit under test; in which case each transformer, resistor, capacitor, choke, and conductor of the circuit should be individually checked for open circuit, short circuit, and grounding. Reference to the diagram, Figure 2, will give the values of the circuit elements and their schematic relations. Figure 3 illustrates the physical locations of the parts and the color coding of the wiring. Defective parts should be renewed only with genuine factory tested replacements.

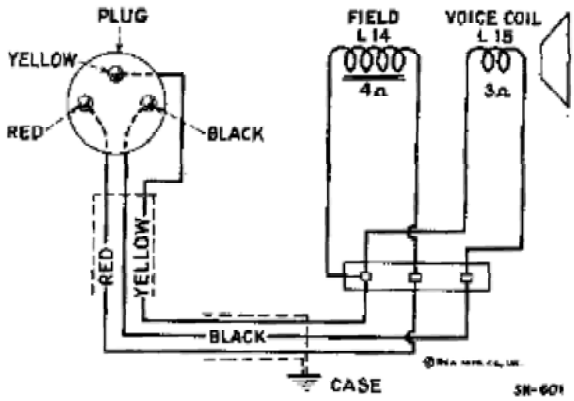

Figure 4—Loudspeaker Schematic and Wiring

Intermittent Operation—Operation may sometimes be irregular. In the majority of cases, the source of such trouble is at a connection or within a tube. Exchange of the tubes is the most definite method of tracing tube defects of this sort. A connection which is intermittent cannot be readily disclosed by regular test methods. Each connection of the complete system of wiring should be carefully inspected and checked to assure that it is secure. Intermittent or distorted reception may occasionally be caused by a partially defective resistor, capacitor, or winding. This type of defect is difficult to isolate; however, the suspected parts should be carefully

checked for proper value, leakage, shorted turns, etc. Should it be impossible to locate the fault by such a method, the receiver should be placed in operation and allowed to operate at full volume for several hours. The weakened or defective part will generally fail completely under such condition and its identification can be established by the regular continuity or voltage tests.

Alignment Procedure

All of the adjustable circuits of this receiver have been properly aligned at the factory to give correct performance, and their settings should remain intact indefinitely when the receiver is used under ordinary conditions. However, necessity for readjustment may occasionally occur from continued extremes of climate, tampering, purported alteration for service purposes, or after repairs have been made to the r-f or i-f tuned circuits. Improper alignment usually causes the receiver to be insensitive, non-selective, and subnormal in respect to tone quality. Such indications will usually exist simultaneously.

In readjusting the tuning circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator, such as the RCA Stock No. 9595, will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to accurately show when the correct point of adjustment is reached. Two indication methods are applicable. One requires use of cathode-ray oscillograph equipment, and the other requires a voltmeter or glow type of indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned. This type of alignment is possible through use of apparatus such as the RCA Stock No. 9558 Frequency Modulator and the RCA Stock No. 9545 Cathode-Ray Oscillograph. Alignment by the output meter method should be indicated by an instrument such as the RCA Stock No. 4317 Neon Glow Indicator. The two procedures are outlined as follows:

OUTPUT METER ALIGNMENT

Place the receiver in operation, with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit or across the output transformer primary. Advance the receiver volume control to its maximum position, letting it remain in such position for all adjustments. For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable at the receiver output. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Adjust the frequency of the oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

(b) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced by the indicating device.

(c) Remove the oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (RCA-6A7) and chassis-ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in (a).

(d) Adjust the two screws of the first i-f transformer for maximum (peak) receiver output. The indication for this adjustment will be broad, due to the "flat-top" characteristic of the i-f system. The two screws should, therefore, be very carefully adjusted so that the indicator remains fixed at maximum as the oscillator is shifted through a range 2 kc. above and below its normal setting of 260 kc. An irregular double-peaked indication is to be avoided.

R-F Adjustments

NOTE: To eliminate vibrator interference, it may be advisable to replace the bottom cover before making the r-f adjustments.

(a) Check the calibration of the dial scale of the remote control unit by rotating the tuning control until the variable condenser plates are in full mesh (maximum capacity). This will carry the dial pointer to its minimum frequency position. The knurled shaft at the rear of the control box should then be turned until the dial pointer sets exactly on the last graduation at the low-frequency end of the dial scale.

(b) Connect the output of the test oscillator to the antenna-ground terminals of the receiver with a 150 mmfd. capacitor in series with the antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Tune the oscillator to 1400 kc. Allow the output indicator to remain attached to the receiver output.

(c) Tune the receiver so that the dial reading is 1400 kc. Then adjust the oscillator, detector, and antenna coil trimmers, C-13, C-8, and C-5 respectively, tuning each to the point producing maximum indicated receiver output.

(d) Shift the oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is best received. The oscillator series [redacted] should then be adjusted, [redacted] ing the receiver tuning [redacted] forward through the signal [redacted] (peak) receiver output result[redacted]

bined operations. The adjustment of C-13 should be repeated as in (c) to correct for any change in its alignment due to the adjustment of C-15.

NOTE: The antenna coil has an iron core which is adjusted at the factory for the correct inductance. **This adjustment should not be disturbed.**

CATHODE-RAY ALIGNMENT

Attach the cathode-ray oscillograph vertical input terminals to the second detector output, with the "Hi" connected to the junction of the two resistors, R-20 and R-21, and the "0" connected to the receiver chassis. Advance the vertical amplifier gain control of the oscillograph to full-on, allowing it to remain at such position for all adjustments. Turn the vertical "A" amplifier to "On." Set the oscillograph power switch to "On" and adjust the intensity and focusing controls to give a sharply defined spot on the screen. Interconnect the frequency modulator impulse generator terminals to the oscillograph "Ext. Sync." terminals, as shown by Figure 5.

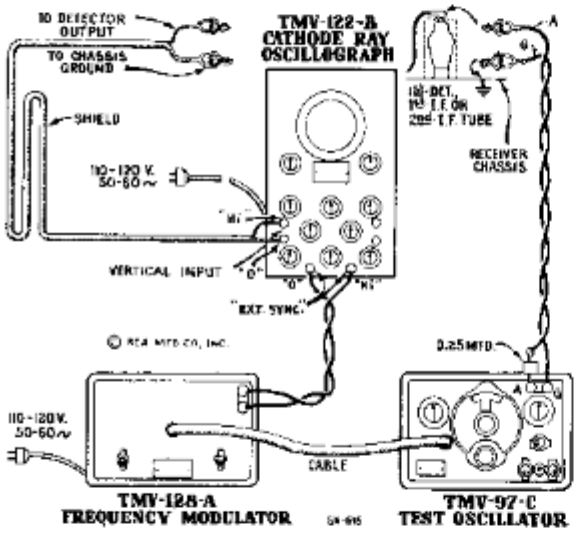

Figure 5—Alignment Apparatus Connections

I-F Adjustments

(a) Connect the output of the test oscillator to the control grid cap of the i-f tube (RCA-6D6) through a 0.25 mfd. capacitor and connect the ground of the oscillator to the receiver chassis. Tune the oscillator to 260 kc., place its modulation switch to "On" and its output range switch to "Hi." The frequency modulator must not be connected to the oscillator for the preliminary adjustments.

(b) Set the cathode-ray oscillograph horizontal "B" amplifier to "Timing" and the synchronizing switch (timing) to "Int." Place the synchronizing input and frequency controls to about their mid-positions. Turn the range switch to its No. 1 position.

(c) Increase the output of the oscillator until a deflection is noticeable on the oscillograph screen. The figure obtained represents several waves of the detected signal, the amplitude of which may be observed as an indication of output. Cause the wave image formed (400-cycle waves) to be spread completely across the screen by advancing the horizontal "B" gain control. The image should be synchronized and made to remain motionless by adjustment of the synchronizing input and frequency controls.

(d) Adjust the two screws (attached to iron cores) of the second i-f transformer, one on top and one on bottom, to produce maximum vertical deflection of the oscillographic wave which is present on the screen. This adjustment places the transformer in exact resonance with the 260 kc. signal.

(e) The sweeping operation should follow, using the frequency modulator. Shift the oscillograph synchronizing switch to "Ext.", change its range switch to No. 2 position and set the frequency control to its mid-position. Place the frequency modulator in operation, with its sweep range switch in the "Lo" position. Interconnect the test oscillator and frequency modulator with the special shielded patch cord provided. Turn the oscillator modulation switch to "Off."

(f) Increase the frequency of the test oscillator by slowly turning its tuning control until two separate, distinct, and similar waves appear on the screen. These waves will be identical in shape, but will be totally disconnected and appearing in reversed positions. They will have a common base line, which is discontinuous. Adjust the frequency and synchronizing input controls of the oscillograph to get the proper waves and to make them remain motionless on the screen. Continue increasing the oscillator frequency until the forward and reverse curves move together and overlap, with their highest points exactly coincident. This condition will obtain at an oscillator setting of approximately 360 kc.

(g) With the images established as in (f), readjust the two screws on the second i-f transformer so that they cause the curves on the oscillograph screen to become exactly coincident throughout their lengths and have maximum amplitude.

(h) Without altering the adjustments of the apparatus, shift the output connections of the oscillator to the input of the i-f system, i. e., between the first detector (RCA-6A7) control grid and ground. Regulate its output so that the amplitude of the oscillographic image is approximately the same as used above for adjustment (g) of the second i-f transformer.

(i) The two first i-f transformer adjustment screws, one on top and one on bottom, should then be adjusted so that they cause the forward and reverse curves to become coincident throughout their lengths and have maximum amplitude. The composite wave obtained in this manner

represents the resonance characteristic of the total i-f system. Lack of symmetry or irregularity of the resultant image will indicate the presence of a defect in the i-f system.

R-F Adjustments

(a) Calibrate the scale of the receiver by rotating the tuning control until the variable condenser is at full mesh, and then turning the knurled shaft at the rear of the control box to bring the dial pointer to the last graduation at the low-frequency end of the scale.

(b) Attach the output of the test oscillator to the receiver input, i. e., between the antenna and ground terminals, with a 150 mmfd. capacitor in series with antenna lead. There should be a shunt capacitor of 50 or 60 mmfd. from the antenna lead at the receiver to ground. Accurately tune the oscillator to 1400 kc. The oscillograph should be left connected to the second detector output circuit as for the above i-f adjustments. Return the synchronizing switch to its "Int." position and turn the range switch to its No. 1 position.

(c) Tune the receiver to a dial reading of 1400 kc. Then regulate the oscillator output so as to increase the amplitude of the waves on the oscillograph screen to a conveniently observable size. The several waves of detected signal, as appearing on the screen, should be synchronized by operation of the synchronizing and frequency controls. Trimmers, C-13, C-8, and C-5, of the oscillator, detector, and antenna coils should then be adjusted so that each causes maximum vertical deflection (amplitude) of the images.

(d) The oscillator modulation should then be turned to "Off" and the frequency modulator placed in operation, connected to the oscillator with the shielded patch cord. Change the oscillograph synchronizing switch to "Ext.", set its range switch to its No. 2 position and the frequency control slightly above its mid-position.

(e) Increase the frequency of the test oscillator gradually, until the point is reached where the two similar, distinct and separate wave images appear on the screen and become coincident at their highest points. This will occur at an oscillator setting of approximately 1500 kc. These waves should be synchronized on the oscillograph screen by careful readjustment of the synchronizing and frequency controls. Readjust trimmers, C-13, C-8, and C-5, to produce complete coincidence at maximum amplitude of the two waves.

(f) Disconnect the frequency modulator from the oscillator. Place the modulation switch of the oscillator to "On" and tune the oscillator to 600 kc. Set the synchronizing switch of the

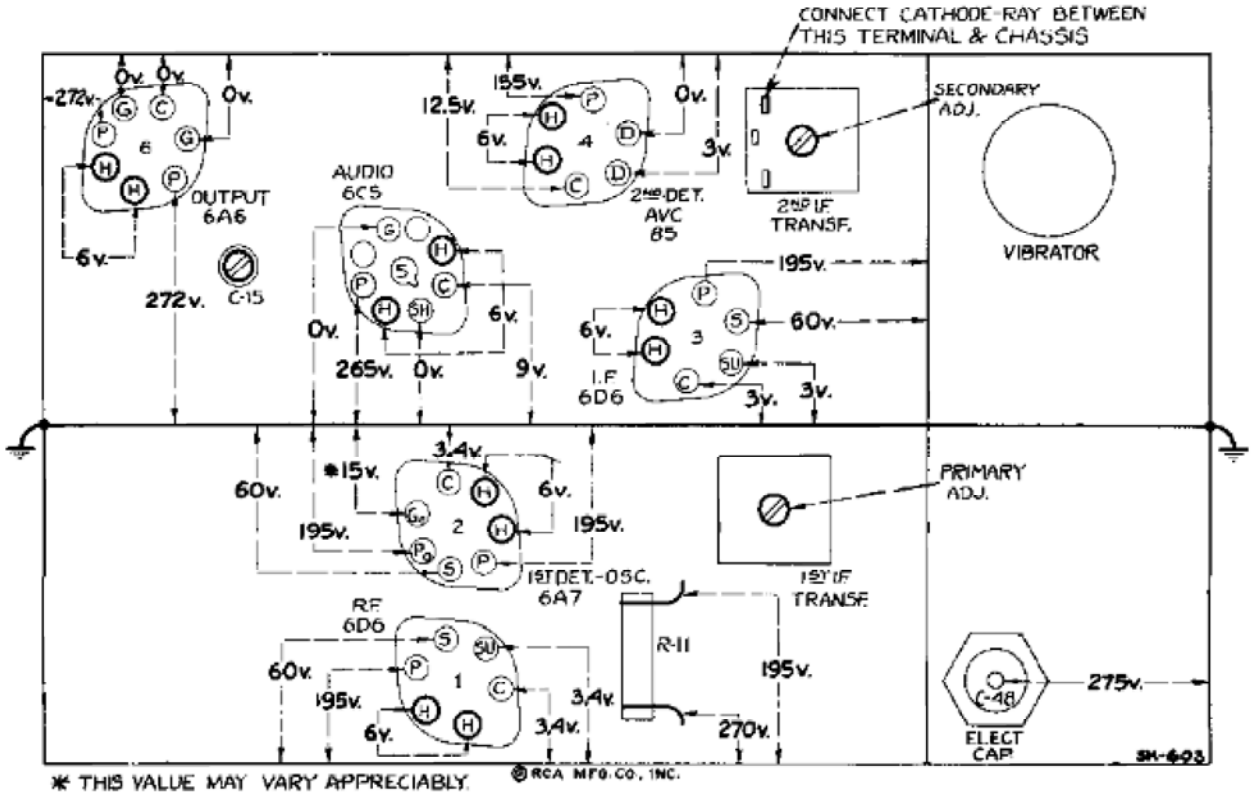

Figure 6—Radiotron Socket Voltages to Chassis

(Measured at 6.3 volts battery supply—Volume Control Maximum—No Signal)

oscillograph to "Int." and turn the range switch to No. 1 position.

(g) Tune the receiver station selector control so as to pick up the 600 kc. signal, disregarding the dial reading at which it is best received.

(h) Change the oscillograph synchronizing switch to "Ext." and place the oscillator modulation switch to "Off." Interconnect the frequency modulator and oscillator with the special shielded patch cord. Return the range control of the oscillograph to its No. 2 position and set the frequency control slightly above its mid-position.

(i) Shift the test oscillator to its 200-400 kc. range and tune it to the point at which the forward and reverse waves show on the oscillograph screen. This condition will obtain at an oscillator setting of approximately 230 kc. The signal obtained from the oscillator for this adjustment will be the third harmonic of 200 kc. An increase in the oscillator output may be necessary. The trimmer C-15 should then be adjusted to the point which produces maximum amplitude of the oscillographic images. It will not be necessary to rock the tuning control for this adjustment, inasmuch as the frequency modulator is varying the signal in an equivalent manner.

(j) Retune trimmers C-13, C-8, and C-5 as in (c), (d), and (e) to correct for any change in high-frequency alignment which may have been caused by the adjustment of C-15.

After the receiver has been replaced in the car, it may be necessary to make a final correction of the dial pointer by tuning in a station of known frequency and adjusting the pointer by means of the knurled shaft on the rear of the control head.

Tuning Condenser Drive

Smooth control should be obtained over the entire tuning range of the variable condenser. If irregularity is present, check the action of the gear mechanism for binding or backlash at every point within the tuning range. A bind may be due to improper mesh between the worm gear and the large gears on the condenser shaft. To correct such a condition, loosen the two screws holding the gear plate and adjust the mesh of the gears to a position which gives smooth operation. Gear backlash is prevented by the small compression spring between the two large gears on the rotor shaft.

Interrupter

The mechanical interrupter used in the power system is constructed with a plug-in base, so as to be easily removed from the receiver. Its adjustments have been correctly set during manufacture by means of special equipment. In cases of faulty operation of the interrupter, a renewal should be made.

Radiotrons

Deterioration of tubes and their approach to failure is usually evidenced by noisy or intermittent operation, loss of sensitivity and distorted tone quality. When suspected as faulty, the tubes should be removed from the receiver and checked with standard tube testing apparatus. It is not feasible to test the tubes while in the receiver, due to measurement inaccuracies which would result from the effects of the circuits.

Receiver Housing

The screws holding the receiver chassis to the case must all be in place and tightly installed, inasmuch as they appreciably affect the ground resistance of the assembly and will consequently have a bearing on the amount of ignition noise received.

Radiotron Socket Voltages

Operating conditions of the basic circuits of this instrument may be determined by measuring the voltages applied to the tube elements. Figure 6 shows the voltage values from the socket contacts to ground and appearing across the heater contacts (H-H). Each value as specified should hold within ± 20% when this instrument is normally operative, with all tubes intact and rated voltage applied. Variations in excess of this limit will usually be indicative of trouble.

The voltages given on this diagram are actual measured voltages, and are obtained with the voltmeter load in the circuit.

To fulfill the conditions under which the d-c voltages were measured requires a 1,000-ohm-per-volt d-c voltmeter having ranges of 10, 50, 250, and 500 volts. Voltages below 10 volts should be measured on the 10-volt scale; between 10 and 50 on the 50-volt scale; between 50 and 250 on the 250-volt scale; and above 250 on the 500-volt scale.

For meters of the 1,000-ohm-per-volt type, but ranges other than above, use the nearest ranges to those specified. If the range is higher the voltage may be higher, if the range is lower the voltage may be lower; either condition depending on the percentage of circuit current drawn by the meter.

REPLACEMENT PARTS

Insist on genuine factory tested parts, which are readily identified and may be purchased from authorized dealers

Hudson Stock No.	RCA Stock No.	DESCRIPTION
		RECEIVER ASSEMBLIES
BO 151315	11130	Capacitor—Adjustable capacitor—C15
BO 152064	11289	Capacitor—50 mmfd.—C25
BO 152065	12270	Capacitor—80 mmfd.—C50
BO 152066	8076	Capacitor—115 mmfd.—C22
BO 152067	11998	Capacitor—115 mmfd.—C16, C17, C19, C20
BO 152068	11181	Capacitor—265 mmfd.—C11, C21, C35, C36, C41
BO 151317	11171	Capacitor—400 mmfd.—C26
BO 152069	4210	Capacitor—600 mmfd.—C47
BO 152070	12268	Capacitor—1,400 mmfd.—C4
BO 152071	12269	Capacitor—2,200 mmfd.—C9
BO 151320	5148	Capacitor—.007 mfd.—C24, C34, C38, C51
BO 152072	4858	Capacitor—.01 mfd.—C3, C23, C32, C33
BO 151324	5196	Capacitor—.035 mfd.—C31
BO 152073	4836	Capacitor—.05 mfd.—C18
BO 151326	4841	Capacitor—0.1 mfd.—C12, C27
BO 152074	12237	Capacitor—0.25 mfd.—C29, C37, C39
BO 151329	11418	Capacitor—0.5 mfd.—C42
BO 152075	5019	Capacitor—0.5 mfd.—C43
BO 152076	12234	Capacitor—8.0 mfd.—C48
BO 152077	12233	Capacitor Pack—Comprising 2 sections of .01 mfd.—C45, C46
BO 152078	12238	Capacitor Pack—Comprising one 8 mfd. and two 10 mfd. sections—C28, C30, C49
BO 152079	12235	Coil—Choke coil—L12
BO 152080	12223	Coil—Antenna Coil—L3
BO 152081	12224	Coil—R. F. Coil—L4, L5
BO 152082	12225	Coil—Oscillator Coil—L16, L17
BO 152083	12220	Condenser—3 gang variable tuning condenser—C5, C6, C7, C8, C13, C14
BO 152084	12006	Core—Adjustable core for I. F. Trans. Stock No. 12228 or No. 12229
BO 152085	12289	Coupling—Station selector flexible shaft coupling
BO 152086	12239	Filter—Antenna filter—L1, L2, C2
BO 152087	12221	Gear—Large gear for tuning condenser—located on condenser shaft
BO 152088	12222	Gear—Worm gear, screw and locknut for variable condenser
BO 152089	12242	Guide—Station selector shaft guide
BO 152090	12232	Reactor—Filter reactor—iron core—L13
BO 152091	5034	Resistor—56 ohm—carbon type—½ watt—R18, R19—Package of 5
BO 152092	12481	Resistor—330 ohms—insulated—¼ watt—R2—Package of 5
BO 152093	12262	Resistor—680 ohms—insulated—¼ watt—R4—Package of 5
BO 152094	12267	Resistor—1200 ohms—insulated—¼ watt—R17—Package of 5
BO 152095	8097	Resistor—5600 ohms—carbon type—2 watts—R11
BO 152096	12265	Resistor—6800 ohms—insulated—¼ watt—R10—Package of 5
BO 152097	12288	Resistor—10,000 ohms—insulated—¼ watt—R12—Package of 5
BO 152098	12266	Resistor—39,000 ohms—insulated—¼ watt—R15—Package of 5
BO 152099	12073	Resistor—47,000 ohms—carbon type—1 watt—R6—Package of 5
BO 151352	5132	Resistor—47,000 ohms—carbon type—1/10 watt—R20—Package of 5
BO 152100	12286	Resistor—56,000 ohms—insulated—¼ watt—R3—Package of 5
BO 152101	12263	Resistor—100,000 ohms—insulated ¼ watt—R16—Package of 5
BO 152102	11281	Resistor—100,000 ohms—carbon type—1/10 watt—R8—Package of 5
BO 152103	12264	Resistor—220,000 ohms—insulated—¼ watt—R21—Package of 5
BO 152104	12285	Resistor—470,000 ohms—insulated—¼ watt—R1—Package of 5
BO 152105	11452	Resistor—470,000 ohms—carbon type—1/10 watt—R5, R7—Package of 5
BO 152106	12287	Resistor—1.5 megohms—insulated—¼ watt—R13, R14—Package of 5
BO 151360	3584	Ring—Retaining ring for RF or oscillator coil
BO 152107	12290	Shield—6D6 or 6A7 radiotron shield
BO 151363	3623	Shield—R.F. or oscillator coil shield
BO 152108	12227	Socket—8 contact radiotron socket
BO 152109	4785	Socket—6 contact 6D6 or 85 radiotron socket
BO 152110	4787	Socket—7 contact 6A7 radiotron socket
BO 152111	12241	Socket—6 contact vibrator socket
BO 152112	12243	Socket—7 contact output (6A6) radiotron socket
BO 152113	12226	Stud—Variable tuning condenser mounting stud assembly
BO 152114	12228	Transformer—First intermediate frequency transformer—L6, L7, C16, C17, R5, R7
BO 152115	12229	Transformer—Second intermediate frequency transformer—L8, L9, C19, C20, C21, R20
BO 152116	12230	Transformer—Audio transformer pack comprising driver and output transformer—T1, T2
BO 152117	12231	Transformer—Vibrator power transformer—T3
BO 152118	12236	Vibrator—Complete
BO 152119	12240	Volume Control—R9
		CONTROL HEAD AND FLEXIBLE SHAFT ASSEMBLY
BO 152120	12279	Bezel—Station selector dial crystal and bezel assembly
BO 152121	12277	Box—Control box complete—less cables, flexible shafts, and knobs
BO 152122	12280	Cover and Switch-Control Box Back Cover and Switch Assembly
BO 152123	12281	Dial Assembly—Station selector dial scale, indicator pointer, shaft and gear assembly
BO 71406	5023	Fuse—15 Amperes—Package of 5
BO 152124	12278	Gear—Station selector idler gear—for control box
BO 152125	4290	Insulator—Fuse connector insulator—Package of 10
BO 151398	11445	Knob—Station selector or volume control knob—Package of 5
BO 71641	11765	Lamp—Dial Lamp—Package of 5

REPLACEMENT PARTS (Continued)

Hudson Stock No.	RCA Stock No.	DESCRIPTION
BO 152126	12273	Lead—A lead and bracket complete with male section of fuse connector—connects control box switch to fuse connector
BO 152127	12274	Lead—A lead—complete with female section of connector—connects control box switch to receiver
BO 152128	12276	Lead—A lead—complete with female section of fuse connector—less fuse and fuse insulator—connects car A terminal to fuse connector
BO 152129	12271	Shaft—Station selector flexible shaft assembly
BO 152130	12272	Shaft—Volume control flexible shaft assembly
BO 152131	12282	Shaft—Volume control shaft for control box
BO 152132	12283	Shaft—Station selector shaft and gear for control box
BO 152133	12275	Socket—Dial lamp socket and lead
BO 151761	11349	Spring—Retaining spring for knob—Stock No. 11445—Package of 5
BO 152134	12284	Spring—Retaining spring for station selector or volume control shafts or idler gear in control box—Package of 10
		MISCELLANEOUS ASSEMBLY
BO 152135	12291	Body—Fuse connector body—Package of 10
BO 152136	4287	Body—Antenna connector body—Package of 10
BO 152137	12253	Bolt—5/16—18 x 3/4" hex head bolt with lockwasher for receiver mounting—Package of 10
BO 152138	4288	Cap—Antenna or fuse connector cap—Package of 10
BO 151402	11447	Capacitor—0.25 Mfd.—Gas Gauge Capacitor
BO 152021	12256	Capacitor—0.25 Mfd.—Temperature Gauge Capacitor
BO 152022	12255	Capacitor—0.5 Mfd.—Generator capacitor
BO 152139	12244	Cover—Receiver housing top cover (nearer flexible shaft ferrule)
BO 152140	12245	Cover—Receiver housing bottom cover
BO 152141	12247	Fastener—Plug fastener for receiver top cover—Package of 10
BO 151726	4286	Ferrule—Antenna or fuse connector ferrule and bushing—Package of 10
BO 152142	12246	Housing—Receiver housing complete with top and bottom covers
BO 151397	4132	Knob—Tone Control knob
BO 152143	12250	Lead—Shielded Antenna Cable—chassis end with section of connector
BO 152144	12251	Lead—"A" lead—complete with male section of connector—(chassis end)
BO 152145	4393	Screw—Set screw for tone control knob—8-32 x 5/16 Headless—Package of 10
BO 152146	12252	Screw—No. 8 self-tapping hex head screw—used on receiver housing—Package of 10
BO 152147	12248	Socket—3 contact socket and bracket assembly for reproducer cable
BO 151724	4284	Spring—Antenna or fuse connector spring—Package of 10
BO 151399	11446	Suppressor—Distributor suppressor
BO 152148	12249	Tone Control—R22
BO 151725	4285	Washer—Antenna or fuse connector insulating washer—Package of 10
		REPRODUCER ASSEMBLIES
BO 152149	12259	Cable—3 conductor shielded reproducer cable complete with 3 contact male connector
BO 152150	12258	Coil—Field—L14
BO 152151	12257	Cone—Reproducer cone—L15
BO 152152	11984	Connector—3 contact male connector for reproducer cable
BO 152153	12260	Housing—Reproducer housing complete
BO 152154	9656	Reproducer—Complete with housing, cable and plug—less mounting stud
BO 152155	9657	Reproducer—Complete, less housing, cable and plug
BO 152156	12254	Stud—Reproducer mounting stud assembly comprising 1 stud, 1 spacer, 2 lockwashers and 2 nuts.