1/4bd
U113
.2
TM 11:232
1941

RESTRICTED

UNCLASSIFIED BY
[illegible] 1945

TM 11–232

WAR DEPARTMENT

TECHNICAL MANUAL

RADIO SET SCR–177–B

August 9, 1941

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

U113
.2
TM11:232
1941

RESTRICTED

TECHNICAL MANUAL
No. 11-232

WAR DEPARTMENT
WASHINGTON, August 9, 1941.

RADIO SET SCR-177-B

Prepared under direction of the
Chief Signal Officer

SECTION I

GENERAL DESCRIPTION

1. Purpose.—The radio set SCR-177-B is a field radio set designed to furnish two-way communication between the tactical field units authorized to use such equipment and for the ground set in air-ground communication.

M590259

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

2. Power.—*a. Input.*—(1) The primary source of power required to operate this equipment is derived from a component part of the radio set SCR-177-B. This component is power unit PE-49-C, which comprises a gasoline engine driving a generator capable of supplying the high voltage needed by the transmitter, the low voltage power consumed by the filaments of the transmitter, and in addition low voltage power to recharge the spare storage battery.

(2) Secondary power is used by both of the receivers in common in the form of a storage battery BB-46. There are two such batteries, one in service and one to be on charge.

(3) For normal voltage and current requirements of the components of this set under different modes of operation see paragraph 41.

b. Output.—The transmitter BC-191-C has a nominal output rating of 75 watts.

3. Modes of transmission and reception.—This radio set transmits and receives the following:

a. Continuous-wave telegraph, abbreviated as "c. w."

b. Tone-modulated, continuous-wave telegraph, abbreviated as "tone."

c. Voice-modulated, continuous-wave telephone, abbreviated as "voice."

4. Distance ranges.—The distance between stations over which communication may be established with this radio set may vary considerably due to frequency, mode of operation, and as a result of terrestrial, atmospheric, and electrical conditions. In general, approximate reliable ranges of this set in miles are as follows:

C. w.	Tone	Voice
100	70	30

5. Frequency ranges.—*a.* The frequency range for reception of this set is from 150 to 18,000 kc., with the radio receiver BC-314-C covering the range 150 to 1,500 kc., and the radio receiver BC-312-C covering the range 1,500 to 18,000 kc.

b. The transmitter has a frequency range of 400 to 800 kc., inclusive, and 1,500 to 4,500 kc., inclusive. When the component transmitter tuning unit TU-3-A is employed the frequency range is 400 to 800 kc., inclusive. When the component transmitter tuning unit TU-5-A is employed, the frequency range is 1,500 to 3,000 kc., in-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:37 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

clusive. When the component transmitter tuning unit TU-6-A is employed, the frequency range is 3,000 to 4,500 kc., inclusive.

6. Channels.—*a.* The general frequency width of transmitted power, or the difference in frequency required between stations operating in the same vicinity depends upon several variable factors such as—

(1) Distance between transmitting and receiving stations.

(2) Selectivity of the receiver with which the transmitter is likely to interfere.

(3) Frequency and mode of transmission.

(4) Nature of the terrain.

b. In general, a separation equivalent to 1 percent of the highest frequency and never less than 20 kc. is practical, providing sets adjacent in frequency are not closer than a few miles.

7. Use.—Radio set SCR-177-B may be used in two-way net communication with the same set or other types of transmitting radio sets listed in the left-hand column of figure 1, provided all radio sets used are within the maximum distance range of the least powerful set. Figure 1 shows the transmitter band of radio transmitters which are a component of each of the above sets and bands of the other types of radio sets which overlap it. Authorized frequencies which lie within the overlapping bands may be selected for such communications.

8. Transport weight and volume.—*a.* The tactical field units authorized to use this radio set are provided with transportation or means of obtaining transportation suitable for the movement of this radio set and the necessary personnel to install and operate the set.

b. The set weighs 1,265 pounds and will occupy somewhat in excess of 40 cubic feet of space when loaded.

c. Dimensions and weights of components are given in detail in paragraph 45.

9. Supply.—These sets are not stocked as complete units but are made up from component parts which are requisitioned, stored, and issued separately. While the Signal Corps General Catalog is controlling in regard to these component parts, they are listed herein for information.

10. Major components.—The major components or field radio set SCR-177-B are—

a. Radio transmitter BC-191-C.

b. Transmitter tuning units TU-3-A, TU-5-A, and TU-6-A.

c. Radio receiver BC-312-C.

d. Radio receiver BC-314-C.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:37 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

e. Antenna tuning unit BC–306–A.
f. Power unit PE–49–C.
g. Battery BB–46 (two required).
h. Antenna components, including reel RL–3.

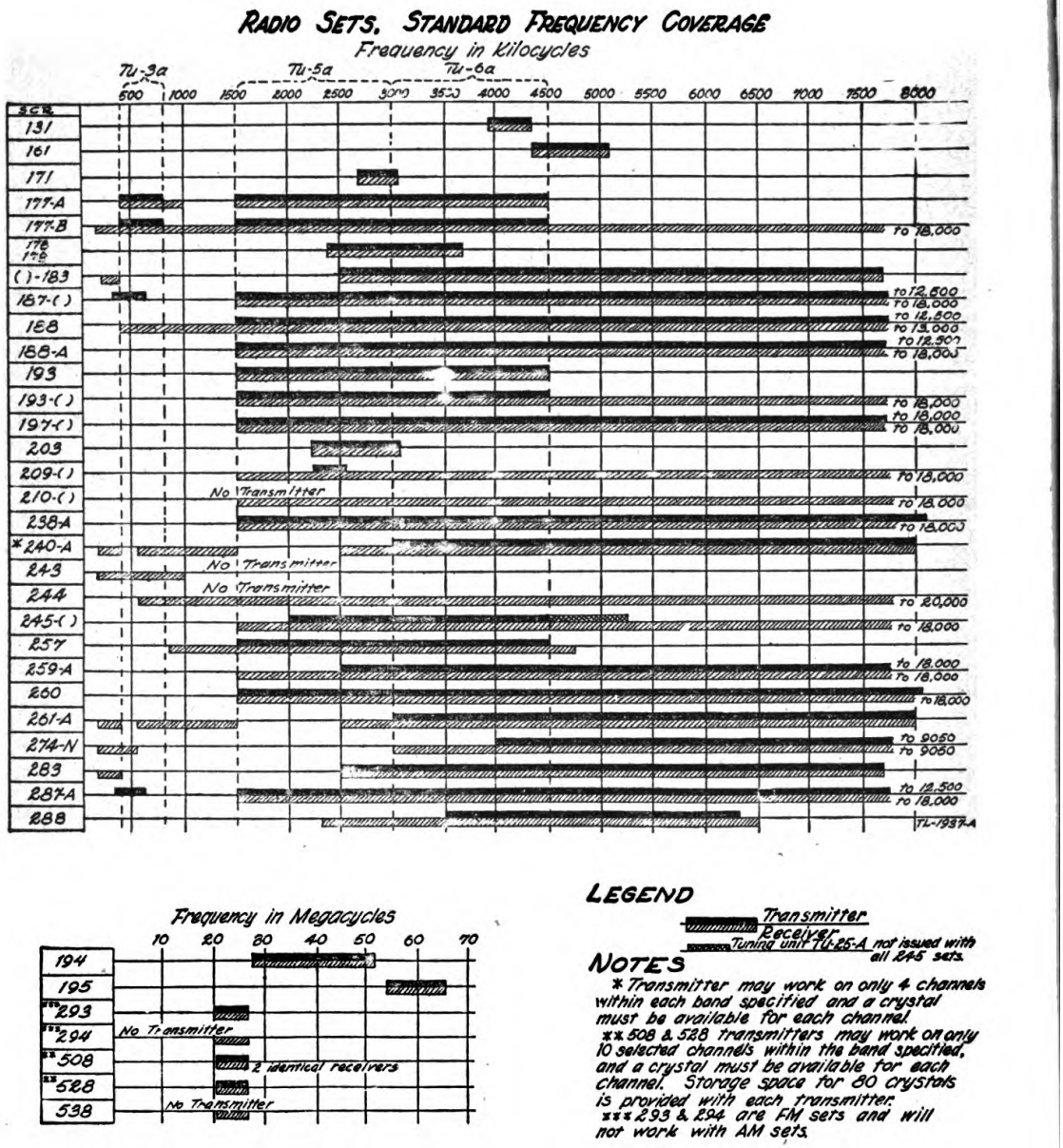


FIGURE 1.—Relation of frequency ranges of radio set SCR–177–B with transmitter tuning units TU–3–A, TU–5–A, and TU–6–A, and other radio sets.

i. Chests CH–27–A, CH–30, CH–32–A, and CH–49; and case CS–48.

11. Radio transmitter BC–191–C, and transmitter tuning units TU–3–A, TU–5–A, and TU–6–A.—The transmitter elements are housed in a metal cabinet composed of a metal front panel,

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:37 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

metal top, sides, back, and bottom supported by a metal frame. The transmitter includes a compartment into which any one of the transmitter tuning units TU-3-A, TU-5-A, or TU-6-A may be plugged. Each tuning unit includes a calibration chart. The front panel of the tuning unit becomes a part of the front panel of the transmitter.

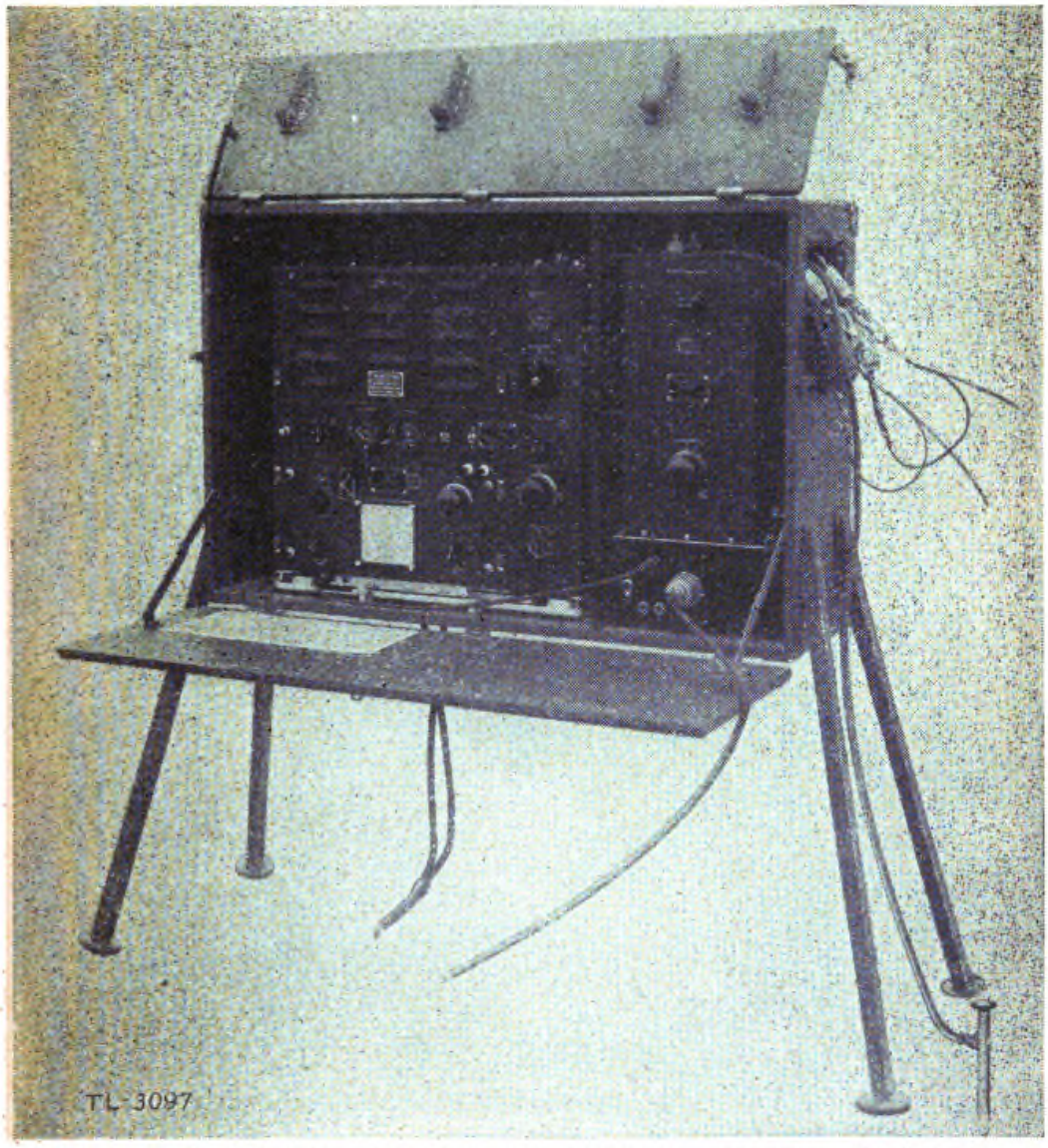


FIGURE 2.—Radio transmitter BC-191-C with transmitter tuning unit TU-5-A and antenna tuning unit BC-306-A installed and corded for transmission and remote control.

Tuning units and transmitter bear serial numbers which identify them as component parts which are always to be used together. Extensions at the corners of the bottom plate of the transmitter cabinet are provided for securing to the mounting FT-151-A. Releasing the snap slides of this mounting permits the cabinet to be lifted from the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:37 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

mounting. Releasing two snap-slide catches on the front of the cabinet permits removal of the tube compartment shield and provides access to the transmitter tube compartment. Removal of the tube compartment shield and transmitter top provides access to the fila-

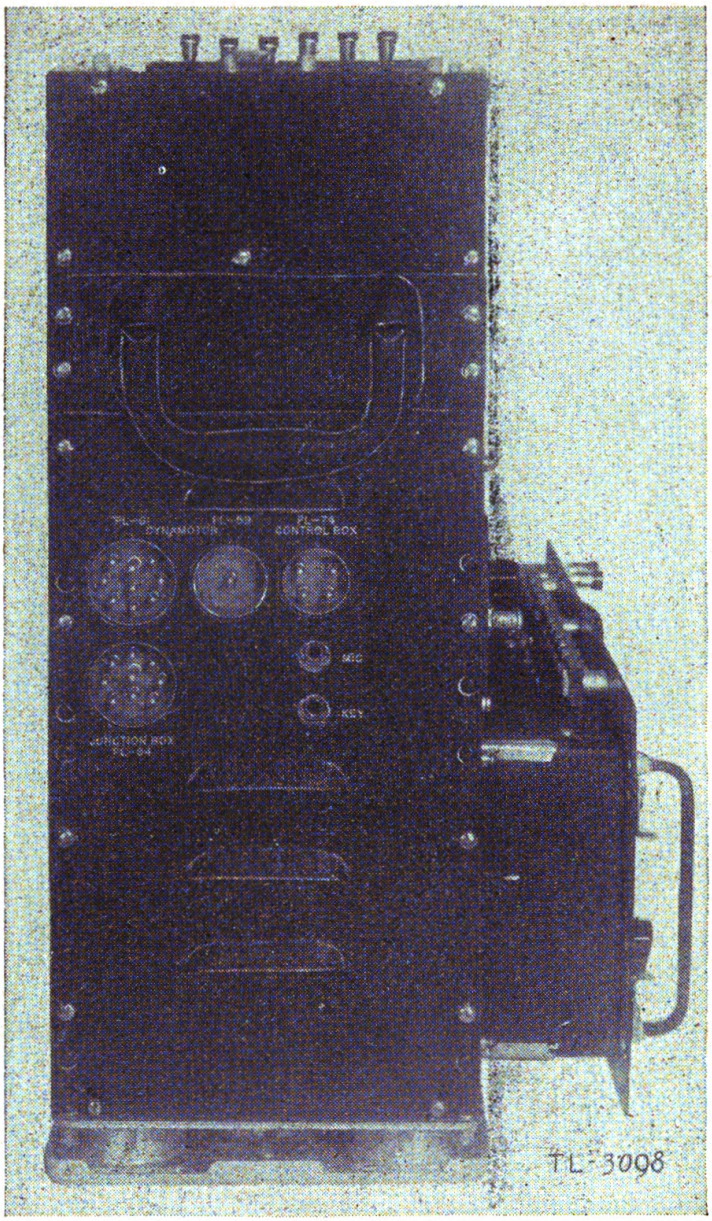


FIGURE 3.—Radio transmitter BC–191–C with transmitter tuning unit partially inserted (left end view).

ment resistor connection board. Removal of the back plate permits access to other circuit elements of the transmitter. The calibration chart is held in place in the center of the transmitter tuning unit by a frame and four thumbscrews. Access to the neutralizing capacitor

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:37 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

adjustment mechanism may be obtained by removing this chart. Two sets of four sockets each are provided, located centrally on the left side and along the bottom of the transmitter to receive the plugs of

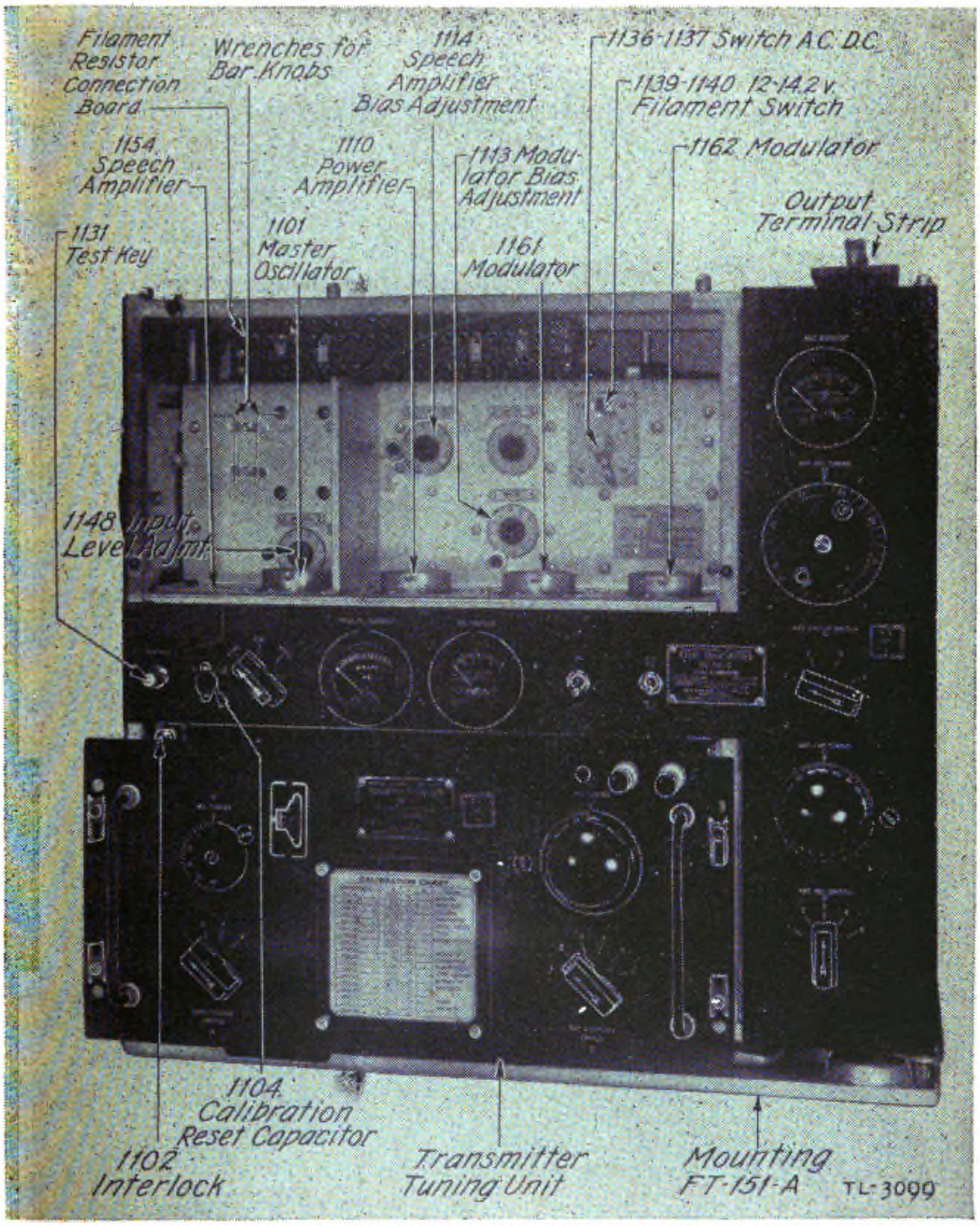


FIGURE 4.—Radio transmitter BC-191-C with tube compartment shield removed and transmitter tuning unit TU-5-A partially inserted.

necessary power and control cords. The radio transmitter of radio set SCR-177-B was designed to be, in addition, a component of other radio sets and the number and function of the socket provisions are

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

in excess of the cording requirements of this radio set (fig. 3). Sockets not used in the cording of this set are covered by socket caps. An output terminal strip of micalex (fig. 4) may be plugged into either of two output terminal plug boards (fig. 5), one of which is located

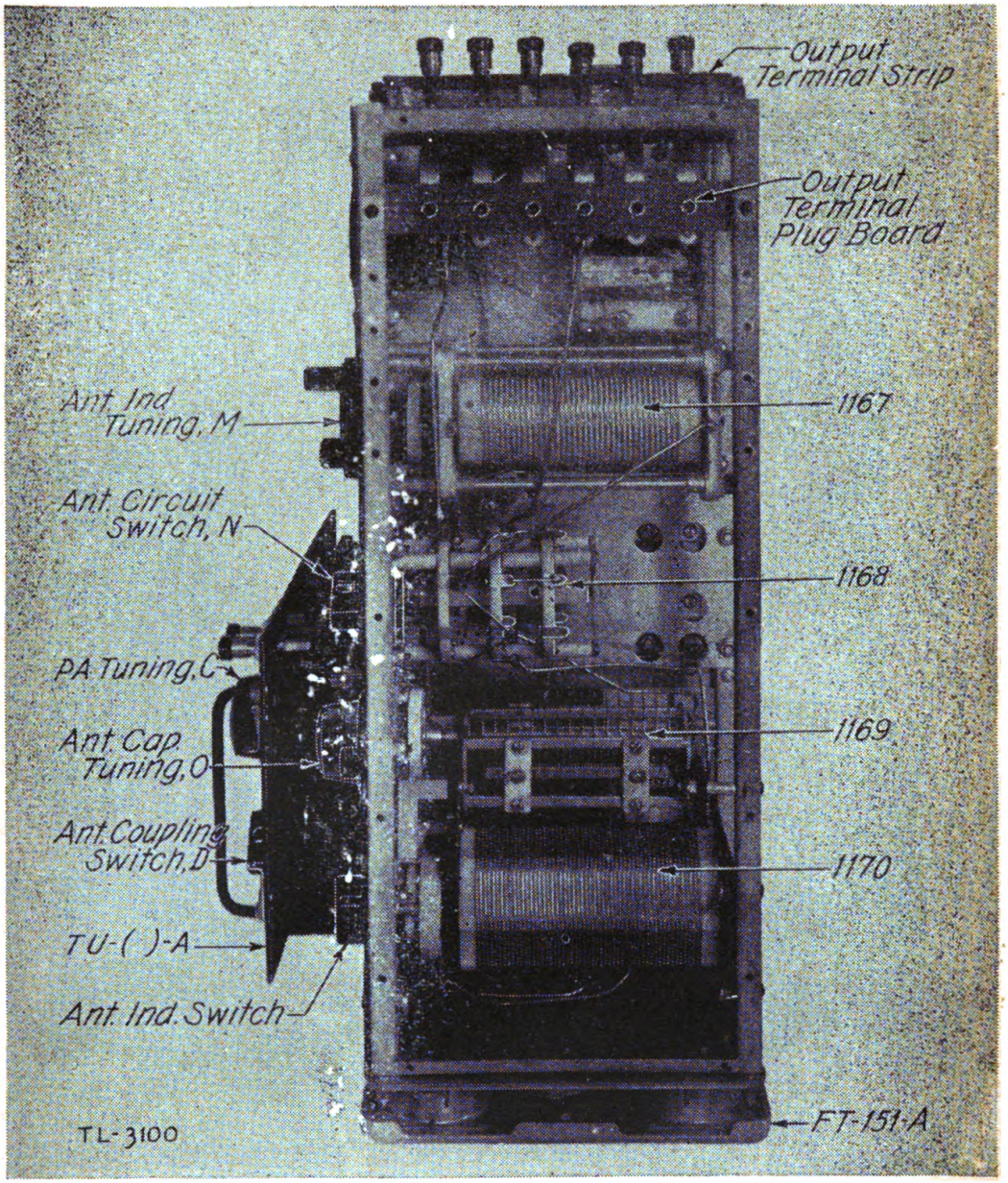


FIGURE 5.—Radio transmitter BC–191–C with cover removed and transmitter tuning unit partially inserted (left end view).

near the top on the right side of the transmitter and the other near the right on the top of the transmitter. The output terminal strip has a marking FRONT on one end, and the strip is to be installed with this marking near the front of its transmitter panel. The termi-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

nal strip is protected by a shield M-191. Ventilation is provided by louvres in the sides, back, and tube compartment shield.

12. Antenna tuning unit BC-306-A.—Antenna tuning unit BC-306-A is fastened to the mounting FT-142 by four snap-slide

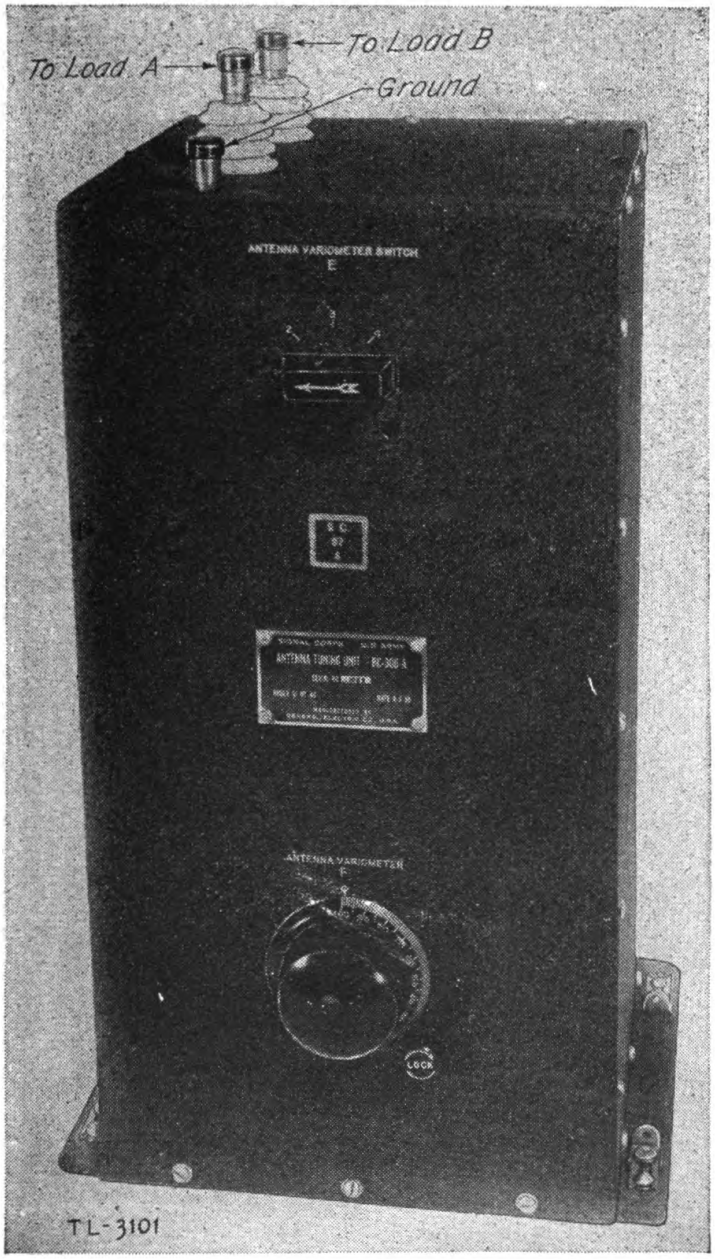


FIGURE 6.—Antenna tuning unit BC-306-A.

catches. The latter may be fastened to a metal shelf, integrally mounted in the chest CH-27-A, by four flathead machine screws furnished with the chest. The antenna tuning unit BC-306-A is a variometer housed in a duralumin case 17¾ inches high by 9½ inches

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

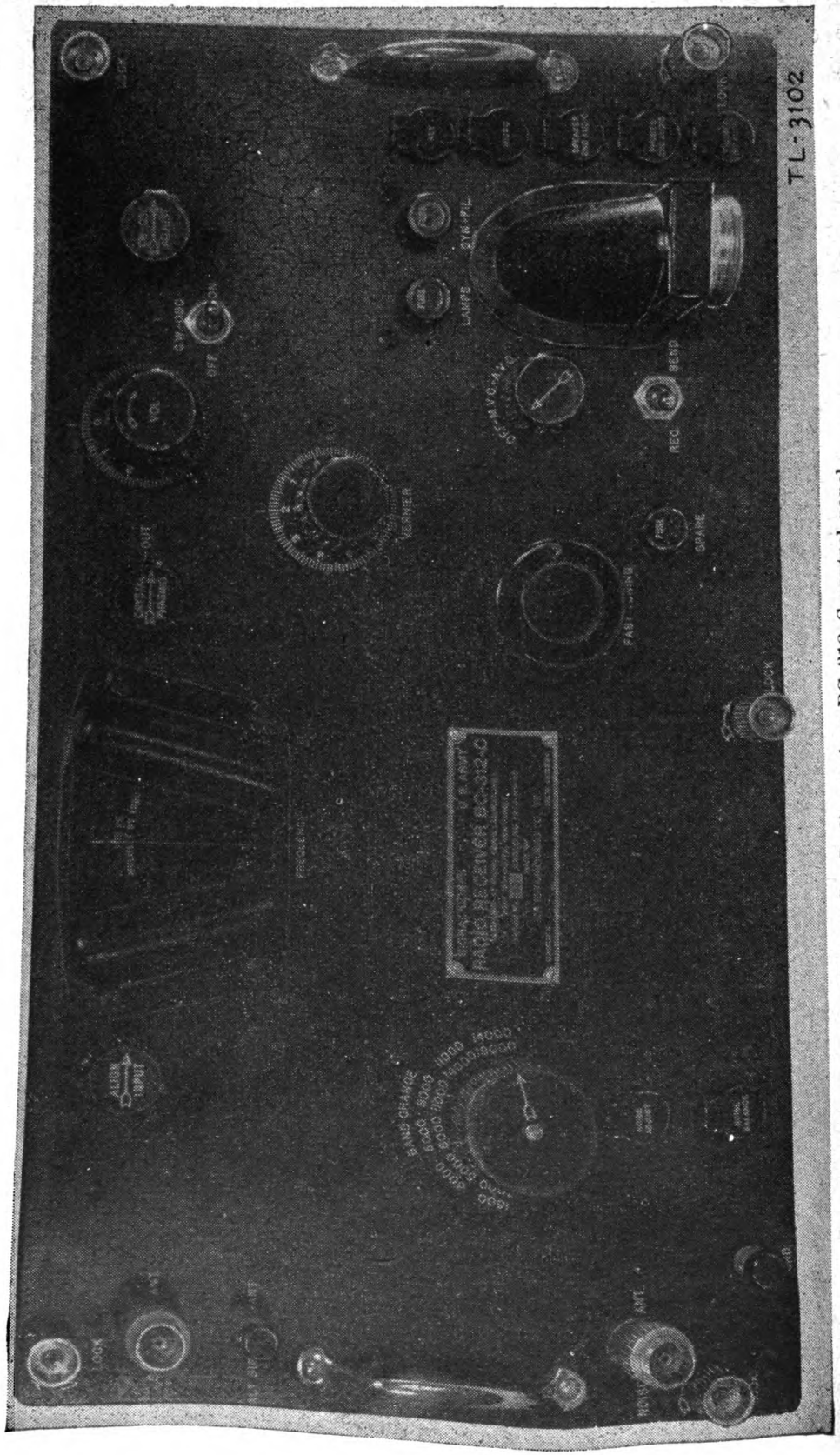


FIGURE 7.—Radio receiver BC-312-C control panel.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

by 9⅛ inches deep. The unit is provided with three binding posts located on the top of the housing. Adjustment is provided for by two controls located on the front of the housing.

13. Radio receivers BC-312-C and BC-314-C.—Radio receivers BC-312-C and BC-314-C are very similar in appearance, assembly, mounting, and in major controls. In each case, the receiver is contained in a metal cabinet. The circuit elements are mounted on a metal front panel and chassis assembly which is entirely removable from the cabinet (figs. 7 and 8). This assembly is secured in the cabinet by five lock knobs on the front panel and may be removed by turning the panel lock knobs in a counterclockwise direction. The cabinet has two snap-slide catches at the bottom which secure it on four rubber shock elements of mounting FT-162. Fuses FU-21, lamp LM-27, and mounting FT-162 are included as parts of the receiver. The radio receiver BC-312-C is secured by its mounting FT-162 in the right-hand portion of the chest CH-49, and corded to the junction box TM-190. In a similar manner radio receiver BC-314-C is mounted in the left-hand portion of the same chest, and corded to the same junction box.

14. Power unit PE-49-C (fig. 9).—This unit consists of a gasoline driven generator with the necessary control and terminating equipment and a filter FL-9. The engine is a single-cylinder, four-cycle, air-cooled type operating at 2,600 r. p. m., and has an adjustable mechanical governor. Starting may be by a rope or by the electric starter facilities provided. The generator is designed to supply the plate current of the transmitter BC-191-C with 350 milliamperes at 1,000 volts, the filament circuit with 15 amperes at 14.6 volts, and the battery charging circuit with 10 amperes at 14.6 volts. A voltage regulator incorporated in the control circuits stabilizes the output voltages so that a change in any one of the three electrical loads does not usually require readjustment of operating points. The engine comprises a subassembly as does the generator and control box, and either may be readily removed from the mounting frame and a replacement subassembly installed with the aid of such tools as are components of the power unit PE-49-C. Both subassemblies are mounted on an aluminum alloy skid frame equipped with handles at either end and 1⅜-inch holes through the frame. The frame holes are for use of a four-man detail using some type of through bars for transport where a truck is not practical. The assembly is covered when not in operation by a metal hood which is fastened to the aluminum alloy frame by three thumbscrews at each end. The metal hood is provided with a compartment for the storage of spare parts, the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

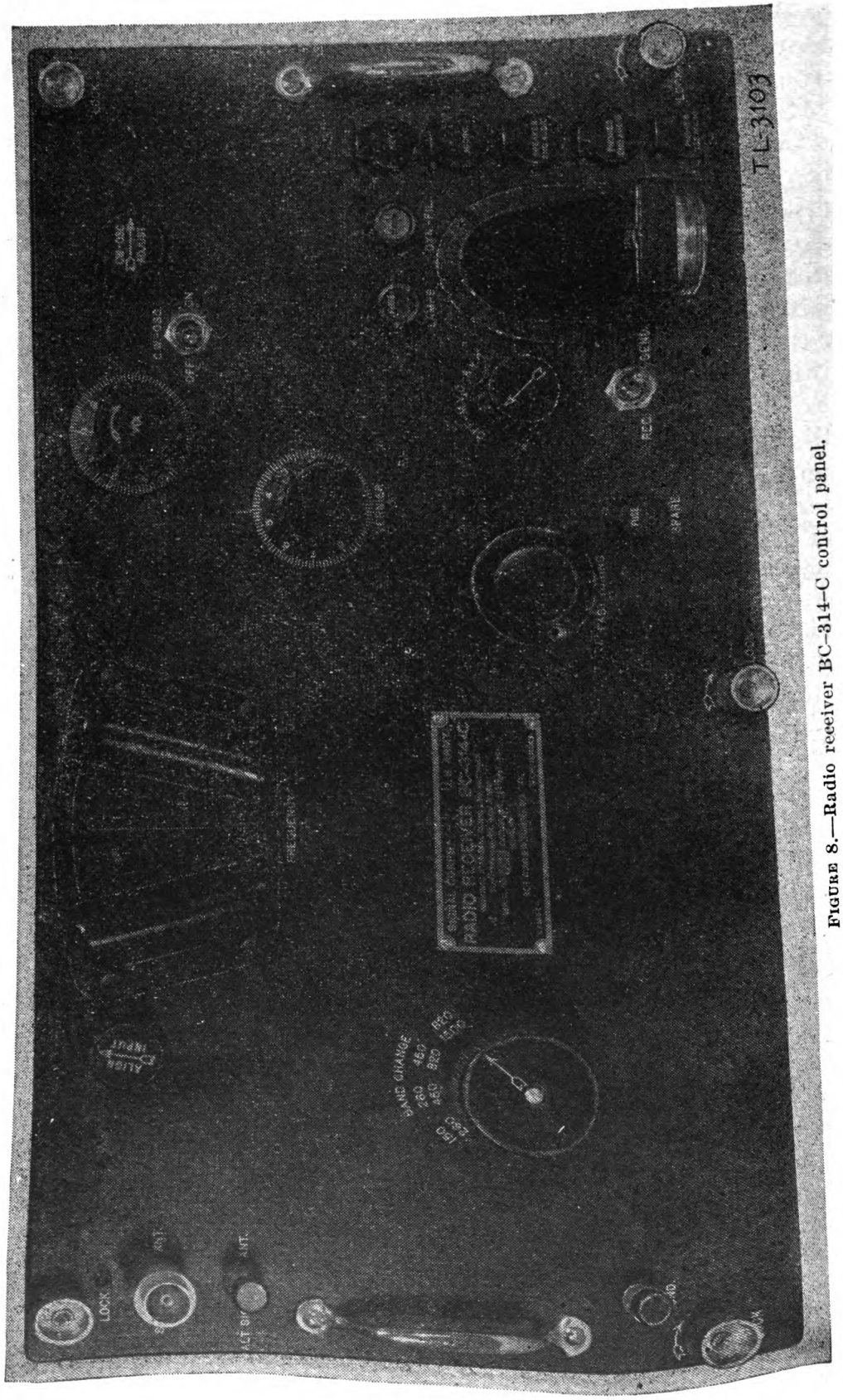


FIGURE 8.—Radio receiver BC-314-C control panel.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:38 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

oil bath air filter, maintenance tools, and filter FL-9. Located in the left rear portion of the storage compartment is a machine screw post, having a wing nut, for the positioned storage of the oil bath air filter. Located in the left front of the storage compartment is a combination

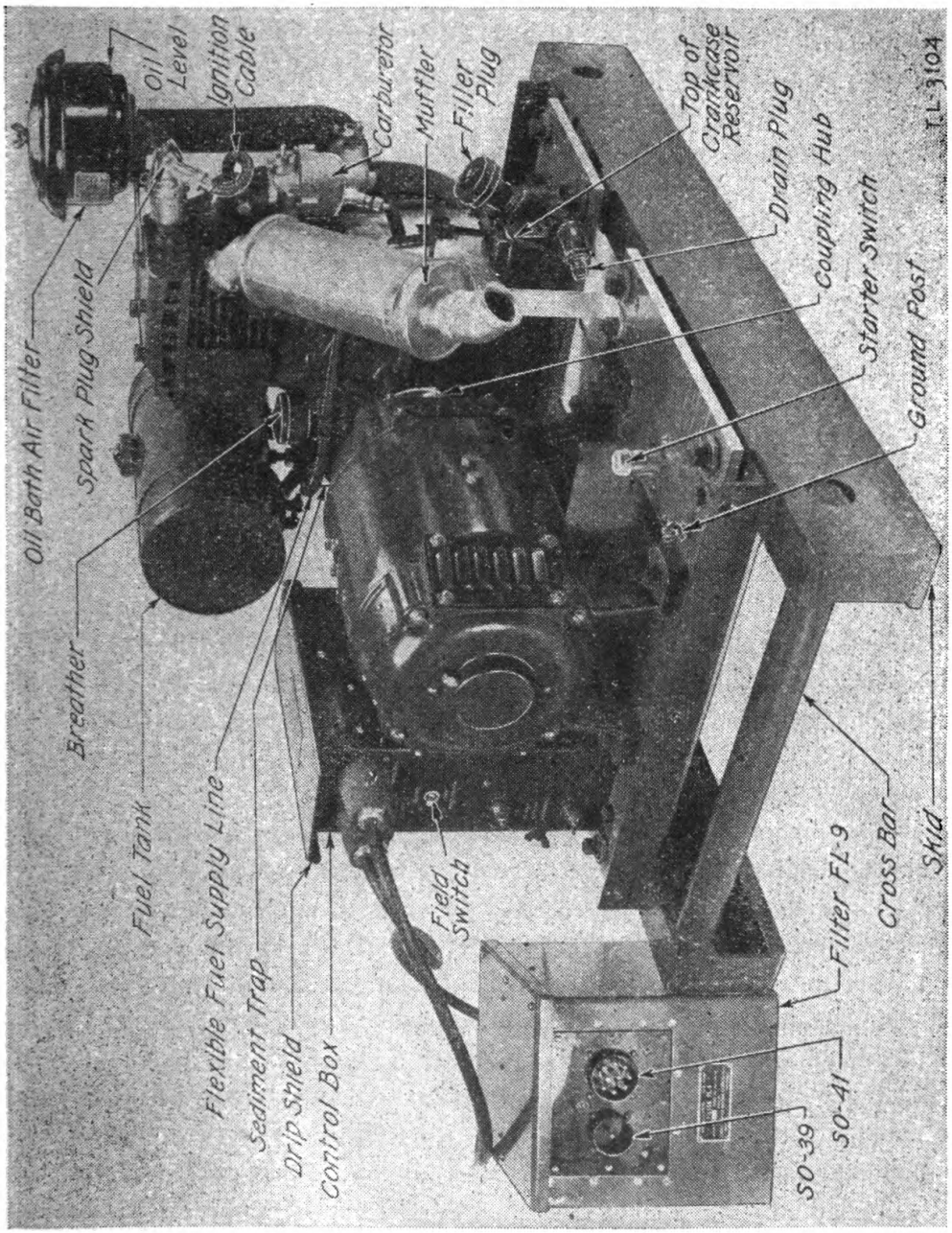


FIGURE 9.—Power unit PE-49-C, hood removed and filter FL-9 corded to control box.

of straps with a buckle and synthetic rubber stops which provide for the positioned storage of the filter FL-9 when not in use. Along the right side of the storage compartment is located a metal bin for the storage of spare parts and tools. The remainder of the storage space

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:39 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

is used for the storage of cords CD-148 and CD-149. The storage compartment is covered by a removable metal plate fastened by three thumbscrews located on the bottom of the plate. The filter FL-9 (see fig. 9) is contained in a metal box 8⅛ inches high by 7¼ inches wide by 7¾ inches deep. On one end are located two sockets for attaching the cords CD-148 and CD-149 and on the other end are attached the integral cords of the filter used for cording the unit to the control box of the generator subassembly.

15. Battery BB-46.—Two batteries BB-46 are components of the radio set SCR-177-B. It is intended that one battery will furnish 12-volt power to operate the two receivers and that the other will be on charge by means of the charging facilities of power unit PE-49-C. The battery BB-46 is rated at 12 volts with a capacity of 75 ampere-hours at a 5-hour rate. The positive and negative terminals are equipped with large thumbscrews for ready attachment of the power cable, cord CD-176-A.

16. Antenna components and reel RL-3.—*a. Transmitting antenna.*—In chest CH-30 will be found the antenna components, with the exception of the mast sections MS-44. There are sufficient items present as components of the antenna that two types of antenna may be erected, either a crowfoot antenna (fig. 15) or an inverted L-antenna (fig. 16). The former is erected when the assigned frequency for transmission is in the frequency range of from 400 to 800 kc., inclusive, and the latter is used for the frequency range of from 1,500 to 4,500 kc., inclusive. A description of antenna components follows.

(1) *Mast section.*—Mast section MS-44 is a hollow aluminum tube, 5 feet in length, with an inner sleeve of the same material which protrudes 6 inches. The diameter of this inner sleeve is such that it is readily inserted into the center hole of the guy plates and into the base end of other mast sections of the same type. The inside diameter of the base end of the most section and the fittings on the mast base connect in a similar manner.

(2) *Mast base MP-19.*—Mast base MP-19 is a steel plate to which is pinned an aluminum alloy hinge plug suitable to be inserted into the base end of MS-44. The steel plate has a hole at each end suitable for stake GP-2.

(3) *Guy GY-21-A.*—Guy GY-21-A is a wire 12 inches long to one end of which is attached a steel plate and to the other end is attached a harness snap.

(4) *Guy GY-22-A.*—Guy GY-22-A is an assembly of two guys fastened to a ring and a harness snap swivel. Each of the component

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:39 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

guys consists of 65 feet of rope RP-3 on which slide two blocks FT-127. One block is fastened to the ring and harness snap swivel common to both component guys, and the other block is fastened to a ring suitable for stake GP-2. One end of the rope terminates in a harness snap and the other end is fastened by fastener FT-9.

(5) *Guy GY-23-A.*—Guy GY-23-A is an assembly of two guys fastened to a harness snap. The component guys each consist of 11 feet of rope RP-3, the free ends of which are terminated in a ring suitable for stake GP-2. One of the component guys has a woven-in marker 10 feet distant from the end for use in ground layout of guying stakes.

(6) *Guy GY-24-A.*—Guy GY-24-A consists of 50 feet of rope RP-3 on which slides a block FT-127. To the block are attached a ring and a harness snap. One end of the rope is terminated in a harness snap and the other end is free.

(7) *Guy GY-30.*—Guy GY-30 is a length of rope on which slides a block. To the block is attached a harness snap. One end of the rope is terminated in a ring and the other in a fastener FT-9.

(8) *Stake GP-2.*—Stake GP-2 is ¾ inch in diameter and 16 inches long with a head 1⅛ inches in diameter. It is made of galvanized iron.

(9) *Antenna AN-21-A.*—Antenna AN-21-A is 100 feet of wire W-29 equipped with a snap hook on one end and connector M-6 on the other. Connector M-6 is a bronze ball which fits into the bronze receptacle of connector BL-5.

(10) *Connector BL-5.*—Connector BL-5 is a bronze clamp suitably chambered to receive three connectors M-6. When the connector BL-5 is not under tension the connector M-6 may be inserted into the receptacle of BL-5 by releasing the knurled thumbscrew and opening the connector in a hingewise manner. The connector is fastened to insulator IN-86 by the snap FT-126.

(11) *Antenna AN-22-A.*—Antenna AN-22-A is 20 feet of wire W-29 on each end of which is connected a snap hook and leads 12 inches long. The end of the antenna intended to be nearest the transmitter is equipped with a Fahnestock clip or the equivalent.

(12) *Antenna AN-23-A.*—Antenna AN-23-A is similar to AN-22-A except that it is 35 feet long.

(13) *Antenna AN-25.*—Antenna AN-25 is similar to AN-22-A except that it is 5 feet long.

(14) *Antenna AN-26.*—Antenna AN-26 is similar to AN-22-A except that it is 25 feet long.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 18:39 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(15) *Antenna AN-27.*—Antenna AN-27 is similar to AN-22-A except that it is 10 feet long.

(16) *Reel RL-3.*—Reel RL-3 is a heavy wire frame essentially flat. To this frame is attached, at an approximate center of rotation, a handle so constructed that it can be gripped firmly and that the reel can rotate in the handle. On the opposite side of the frame is a somewhat different handle which is useful in acting as a crank to cause the reel to rotate. The device is used to roll up guys, rope, and antenna sections in a manner suitable for storage in the chest CH-30, and at the same time be ready for immediate paying out at an antenna site.

(17) *Insulator IN-86.*—Insulator IN-86 consists of an isolantite body 2 inches long and ¾ inch in diameter, into which are screwed eye bolts. The isolantite body may be replaced if broken and the eye bolts again used.

b. Receiving antenna.—No prepared antenna is provided in this radio set for attachment to the receiver antenna posts. It is intended that wire W-29 will be attached to the antenna binding posts and that the far ends be attached to trees or other convenient supports.

17. Chests CH-27-A, CH-30, CH-32-A, and CH-49, and case CS-48.—The various components of radio set SCR-177-B, exclusive of the power unit PE-49-C and mast sections, are either mounted in or stored in chests CH-27-A, CH-30, CH-32-A, and CH-49, and case CS-48 as follows:

a. Chest CH-27-A.—Chest CH-27-A is used to house the transmitting elements. The radio transmitter BC-191-C is secured in the left-hand portion by means of the mounting FT-151-A. Openings in the bottom of the chest permit the cording from the power unit to be brought into the bottom of the transmitter. A partition in the right portion of the chest makes a space in which the remote control connections of the jack panel are mounted. Above the jack panel is a metal platform to which the mounting FT-142 is fastened and on which the antenna tuning unit BC-306-A is mounted and fastened by snap-slide catches. The partition has an opening through which the connections between the transmitter and antenna tuning unit are carried. There is a door in the upper right end of the chest through which the lead-ins from the antenna and counterpoise are brought into the equipment. The chest is equipped with a system of doors, one of which opens outward and downward and is stopped in its downward movement by hinged braces so that the door is stopped in a horizontal position. The other half of the door is hinged upwardly and held in a horizontal position by a

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 18:39 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

hinged locking brace so as to afford the equipment front some protection from the weather. The chest is mounted on four removable legs so that the equipment is at a convenient level for operation. The dimensions are 29½ by 42⅜ by 16¼ inches and the total weight less equipment is 59 pounds. When not in use the legs may be placed in brackets mounted on the back of chest CH–27–A.

b. Chest CH–30.—Chest CH–30 is 16 by 46 by 12 inches, weighing

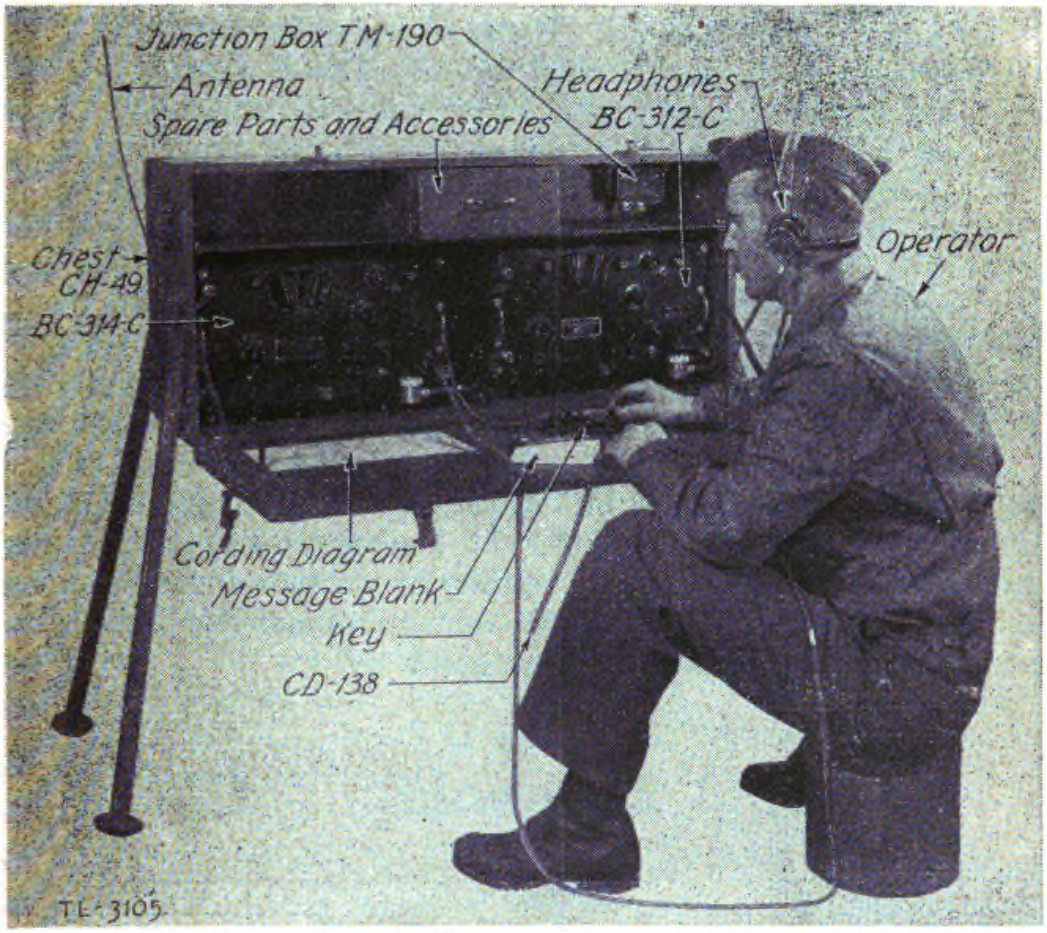


FIGURE 10.—Receiving chest CH–49 with radio receivers BC–312–C, BC–314–C, and junction box TM–190 installed, and BC–314–C monitoring a transmission.

68 pounds. It is used for the storage of antenna components less the mast sections. The removable legs of the chests CH–27–A and CH–49 may also be stored between cleats on the bottom of the chest when the radio set is packed for movement or storage. The chest is divided internally into one long compartment in which the loaded reels RL–3 are placed along with stakes, hammer, and other items, and a small compartment in which the small items of the antenna components are stored. The chest is equipped with a single door having hinges and suitable fasteners.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

c. Chest CH-32-A.—Chest CH-32-A is 19 by 30 by 11½ inches, weighing 80 pounds. It was designed to carry three cases CS-48 which are used for the storage of transmitter tuning units when not in use. Since one transmitter tuning unit may always be conveniently carried in place in the transmitter, two cases CS-48 only are included in the authorized components of this radio set. The remainder of the space in chest CH-32-A is utilized for the storage of cords CD-138.

d. Chest CH-49 (fig. 10).—The chest CH-49 is 18 by 41¼ by 11⅞ inches and weighs 60 pounds. The receiving equipment is installed, transported, and operated in chest CH-49. This is a sturdy wooden chest supported at convenient height by four detachable legs. It has two carrying handles and is provided with a hinged front and three small doors in the back, the latter to provide access to sockets in the terminal box and receivers. Space is provided for one radio receiver BC-312-C and one radio receiver BC-314-C in the lower part of the chest, and for the junction box TM-190, the microphone T-17, keys J-47, cords CD-133-A, fuses, pilot lamps, and vacuum tubes in the upper part of the chest. Holes are drilled and bolts are provided with which to fasten the two receiver mountings and the junction box.

e. Case CS-48.—Case CS-48 is 7⅞ by 16¾ by 8 inches and weighs 4¼ pounds. It is the case into which transmitter tuning units not installed in the transmitter are placed. The construction of the case is such as to offer protection and security to transmitter tuning units, and the assembly of the transmitter tuning unit and case is stored in chest CH-32-A as prescribed in paragraph 19*f*.

SECTION II

EMPLOYMENT

18. Limitations.—These sets have the usual limitations possessed by any radio set of the same power, mobility, and frequency range.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

The distance ranges (par. 4) and channels (par. 6) must be considered approximations which are affected by many factors, the majority of which are not controlled by the using organization. Some of the factors which are controllable are listed below and require the attention of the operating personnel if the sets are to operate most effectively.

a. Distance range.—(1) All other things being equal, distance range is increased by—

(*a*) Frequent inspection of the set and correction of all defects. For inspection procedure, see paragraph 36.

(*b*) Using c. w. in preference to tone, and either c. w. or tone in preference to voice.

(*c*) Accurate tuning and transmissions.

(*d*) Avoiding all obstructions either natural or man-made, particularly intervening eminences such as tall metal structures, and power, telephone, and telegraph lines. The type and contour of the ground affect the range. The location of the antenna and counterpoise in the region of tall vegetation will materially reduce the range of a set. A change of location to a more favorable place may increase the range.

(2) In some situations where only very short ranges are required, the range may be decreased and interference reduced by operating with a reduced antenna (operate with less than the recommended number of antenna sections) or by the use of less than the total amount of power available to excite the antenna circuit (lower numbered setting of antenna coupling switch D).

b. Channels.—All other things being equal, the number of channels available is increased by—

(1) Use of c.w. in preference to other modes of transmission.

(2) Careful adjustment of the transmitter with respect both to frequency and to degree of modulation.

(3) Assignment of frequencies as far apart as possible to nets which must be located close to each other.

19. Minor installations and inspections prior to service.—*a. Care.*—Particular care must be observed when unpacking or handling this equipment. When not protected by cabinets or shock mountings it may readily be damaged. Inspect the equipment visually for damage when removing it from the shipping box. If necessary clean with brush or blower before installation. ***Caution:*** A check of the items on hand against the items listed in paragraph 45 will show whether or not the shipment is complete. A frequent inventory of the large number of items comprising this radio set will insure that

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

the set is always ready for service. This is particularly necessary when operating in the field under adverse conditions, as at night.

b. Chest lists.—Prepare a list of the items normally stored in each chest and fasten it to the inside of the lid or door of each respective chest.

c. Minor installations.—Minor installations are made as indicated below. All controls, knobs, switches, jacks, etc., identified by markings will hereafter be designated by such markings; that is, a three-position switch on the front panel of the transmitter has the marking TONE CW VOICE above the three possible positions of the switch pointer. This switch will hereafter be designated as the TONE CW VOICE switch. The practice of marking functionally similar items on receivers and transmitters differs somewhat, that is, the jacks intended for the use of the plug attached to the microphone are marked MIC on the transmitter and MICRO on the receiver.

(1) *Transmitter BC-191-C.*—(*a*) If necessary, place a pilot lamp LM-27 in the socket behind the ruby reflector located between the filament voltmeter and the total plate current meter on the front panel. This is accomplished by removing the transmitter tuning unit from its position in the transmitter.

(*b*) Remove the tube compartment shield and insert the vacuum tubes in sockets marked with the respective Signal Corps type numbers.

(*c*) Inspect the fuses located in the transmitter. There are three; one active and two spare. This is accomplished by removing the transmitter tuning unit and inspecting the active fuse FU-12 located in the lower portion of the transmitter BC-191-C above the tuning unit compartment. The spare fuses FU-12 are located in the transmitter below the tuning unit compartment near the front panel of the transmitter.

(2) *Power unit PE-49-C.*—Power unit PE-49-C will normally be received ready for service except for crankcase oil and gasoline. However, the following checks should be made:

(*a*) *Fuses.*—Located in the control box are two fuses FU-12-A and FU-13. The former is rated at ½ ampere and 1,000 volts, and the latter at 30 amperes and 250 volts. A check should be made to see that the fuses are in place and in satisfactory condition. The latter fuse *only* is of the refill type using fuse link M-141 to restore the fuse to working condition. Located on the cover to the control box are one each spare fuses of the types mentioned above and in addition a brass carrier which should contain 6 fuse links M-141.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*b*) *Mechanical checks.*—The following mechanical parts should operate freely when moved by hand (see fig. 9):

1. Motor generator shaft (between compression strokes).
2. Governor lever arm (see fig. 11).
3. Choke lever.
4. Reverse current relay (REVERSE CURRENT CUT-OUT) (fig. 12) armature should open and close with a slight pressure of the fingers.

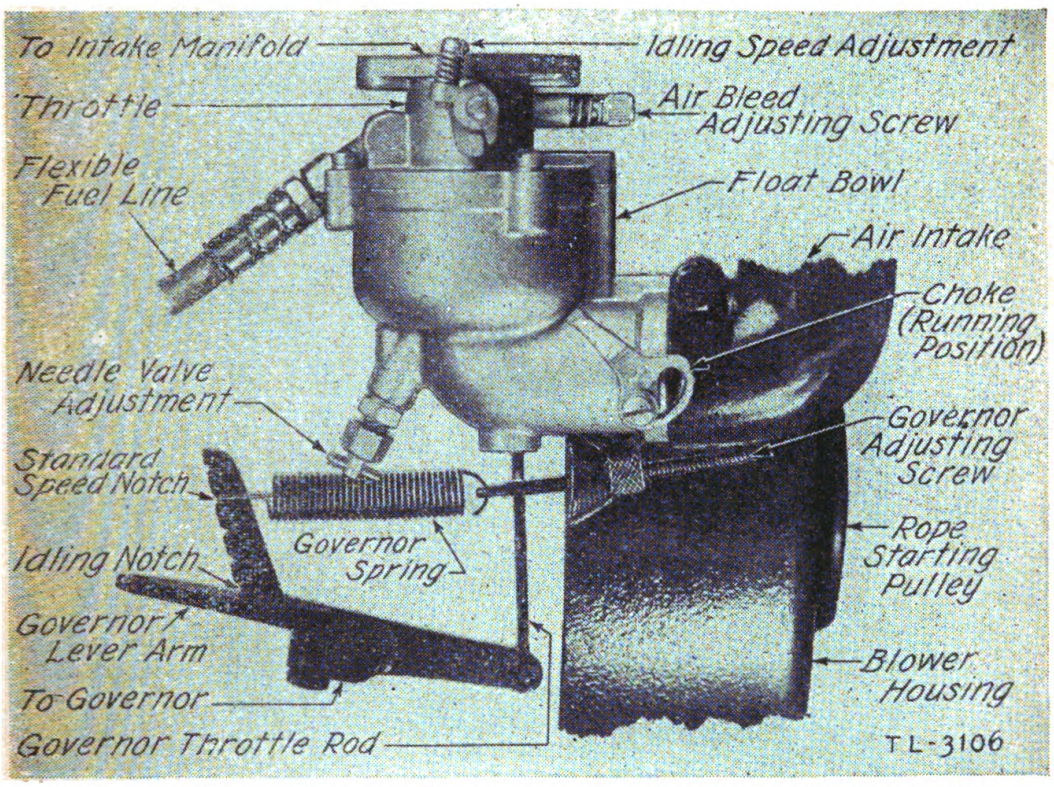


FIGURE 11.—Power unit PE-49-C governor and carburetor assembly (partial view).

5. Voltage regulating relay (fig. 12) should operate freely with a slight upward pressure of the fingers.
6. Switching relay (fig. 12) should readily close by the use of manual pressure with both arms marking a good "wiping" contact.
7. All nuts, screws, bolts, and cotter pins should be firmly in place.
8. Sediment bowl located beneath the gasoline tank should be firmly held in place by the knurled nut locking system associated therewith.
9. Spark plug and interference shield should be securely positioned. Check to see that the spark plug is screwed

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

snugly (tight but not so tight as to crack the porcelain insulator) into place.

The tools, a component of power unit PE–49–C, are suitable to make all field adjustments and repairs. For a list of these tools see paragraph 36*b*(12).

(3) *Receivers BC–312–C and BC–314–C.*—(*a*) If necessary, insert two pilot lamps LM–27 in sockets which are accessible upon removal of four thumbscrews and the reflectors secured thereby from the

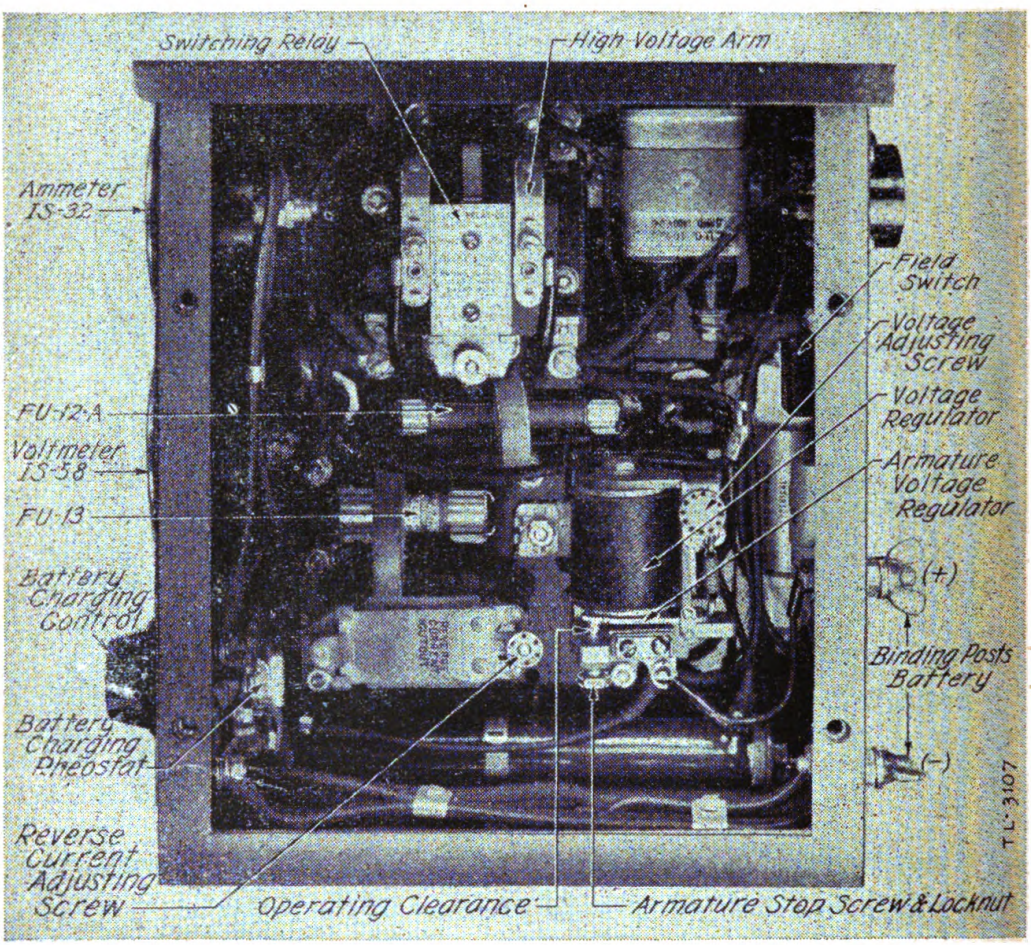


FIGURE 12.—Power unit PE–49–C control box (internal view).

front panel. The reflector is the fitting which covers the main tuning dial directly above the marking **FREQUENCY.** Replace the reflector after insertion of the pilot lamps.

(*b*) These receivers are ordinarily furnished with tested vacuum tubes installed. *Do not remove or interchange these tubes unless they are defective.* The external appearance of each of the vacuum tube sockets is identical except for the chassis markings which indicate the Signal Corps type number of the vacuum tube intended for

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

each socket. If necessary, disconnect the power cord and insert the proper tubes in the sockets. These sockets are accessible upon removal of the front panel and chassis assembly from the cabinet with the exception of those in the c. w. oscillator and r. f. oscillator compartments. The c. w. oscillator tube socket is accessible upon removing the top front screw, removing the screw in the center of the right side, loosening a screw at the bottom rear, and then lifting off the compartment cover. The r. f. oscillator tube socket is accessible upon loosening two screws at the top right side and lifting the hinged cover of the compartment.

d. Inspection and inventory of chest CH-27-A (fig. 2).—Chest CH-27-A will be inspected and a check made to see that the mounting provisions of all of the component items normally contained therein are secure and in order. If necessary, radio transmitter BC-191-C with mounting FT-151-A, antenna tuning unit BC-306-A with mounting FT-142, and the jack panel should be properly installed therein. The chest as furnished is normally prepared for fastening the above mounting items.

e. Inspection and inventory of chest CH-49 (fig. 10).—Chest CH-49 was designed for the installation of radio receivers BC-312-C, BC-314-C, junction box TM-190, and with space provided for spare tubes, pilot lamps, and other accessories. The mountings FT-162 are bolted to the chest and the receivers are fastened to the mounting by two slide fasteners, a part of the cabinet of each radio receiver. The junction box TM-190 is bolted to the chest CH-49 by means of four screws and space blocks furnished with the assembly of TM-190 and cords CD-340 and CD-341.

f. Inspection of chest CH-32-A.—This chest normally provides space for the three transmitter tuning units or two transmitter tuning units as contained in cases CS-48 and two cords CD-138, since one transmitter tuning unit will normally be carried in the transmitter. In the initial installation of CH-32-A it will be necessary to drill holes in cases CS-48 for mounting in chest CH-32-A as shown in figure 13.

g. Inspection and inventory of chest CH-30.—An inspection and inventory of the antenna components and other items mentioned in paragraph 21*a* (list of components) should be made to determine the presence and serviceability of all items.

h. Battery BB-46.—The component storage batteries BB-46 of this radio set should be inspected for the condition and level of the electrolyte and to insure that they are in a fully charged condition. If necessary, correct by the addition of distilled water and charging. If

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:01 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

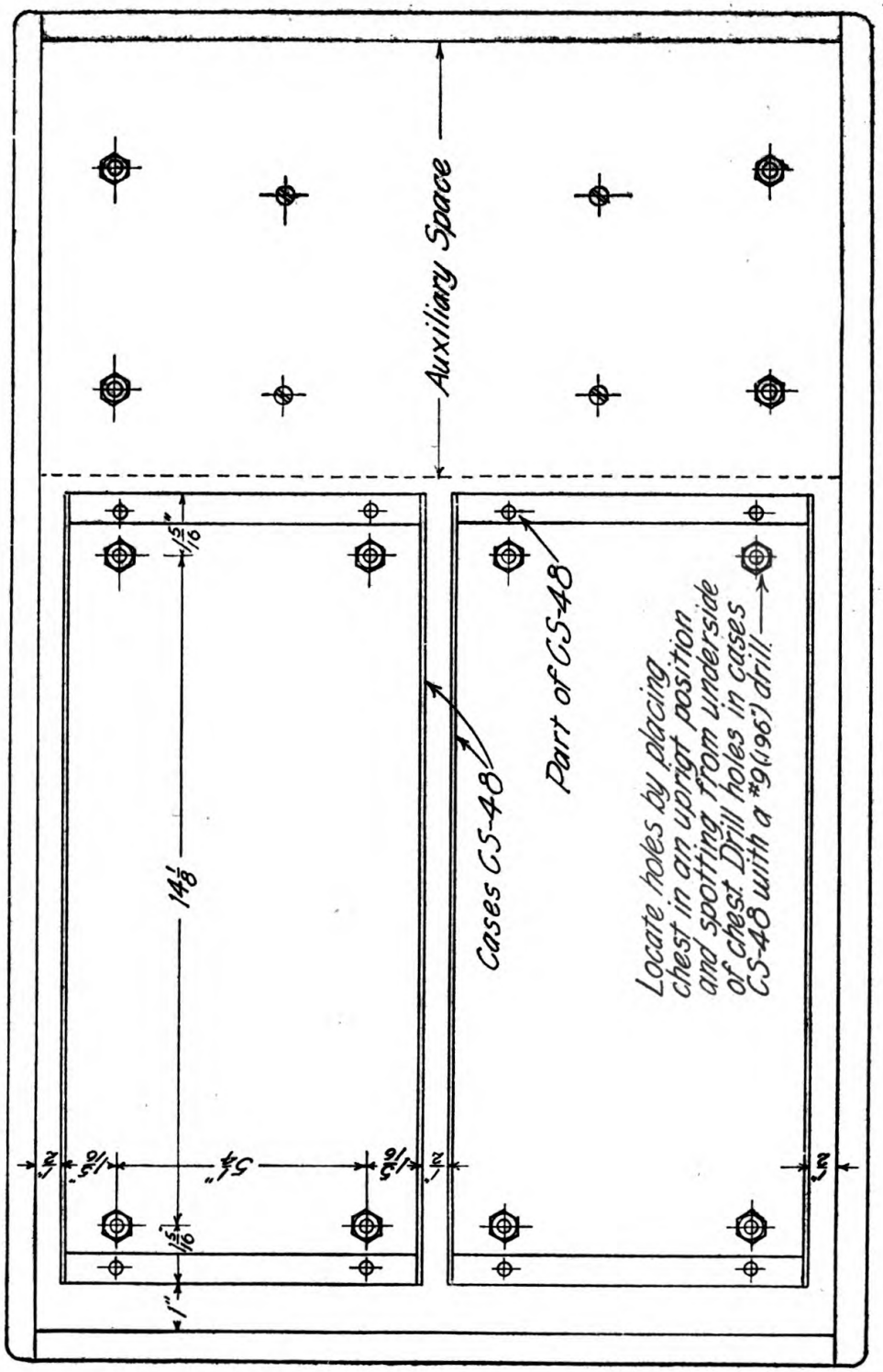


FIGURE 13.—Equipment installation in chest CH-32-A as component of radio set SCR-177-B.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

received from the supply base as a "dry packed battery," the necessary battery acid will have to be requisitioned and added. (See TM 11-430 (now published as TR 1190-5).)

20. Installation for service (fig. 14).—*a. General.*—The cording diagram of the radio set SCR-177-B gives the general features of this radio set and is included as a part of chests CH-27-A and CH-49. The maximum physical separation of the components of this radio set which is permitted by the length of the several interconnecting cords is desirable. Separations of about 50 feet between the transmitter and power unit, of about 300 feet between the transmitter and receiving equipment, and about 15 feet between the transmitting chest and the mast (main mast) are desirable for the following reasons:

(1) The noise made by the power unit in action may interfere with reception and intercommunication between transmitter and receiver.

(2) Electrical disturbances generated in the power unit may interfere materially with reception.

b. Terrain.—(1) Level ground for the location of the transmitting and receiving chests and the power unit is desirable. Since no formal antenna is provided for the receivers of this radio set, it will always be found desirable to locate the receiving chest near some convenient natural or existing support for receiving antennas. The location of the transmitting antennas should be such that undue absorption of the radiation is not produced by high vegetation or other natural or man-made eminences. It is desirable that the receiving antennas be located at right angles to each other. The location of the power unit at a distance from the message center and headquarters will be found to be desirable.

(2) (*a*) The selection of terrain with natural obstacles to vehicular traffic or removal from routes of such traffic in conjunction with the transport requirements of the components of this radio set should be considered. In any event, the security of the installation from cross traffic should be provided for by the use of white rag streamers suitably displayed, or other available means.

(*b*) Locations near lanes of motorized vehicular traffic are adversely affected by the ignition noises of such traffic.

c. Transmitting equipment.—(1) The transmitter chest should be located approximately 15 feet from the main mast base in order that the antenna lead will not run parallel to the metal mast. The chest should be mounted on legs and the front cover opened to provide an operating table. The right end of the chest is equipped with two hooks which, when the small door is opened, serve as supports for the antenna and counterpoise lead-in wires (see fig. 2). It will

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

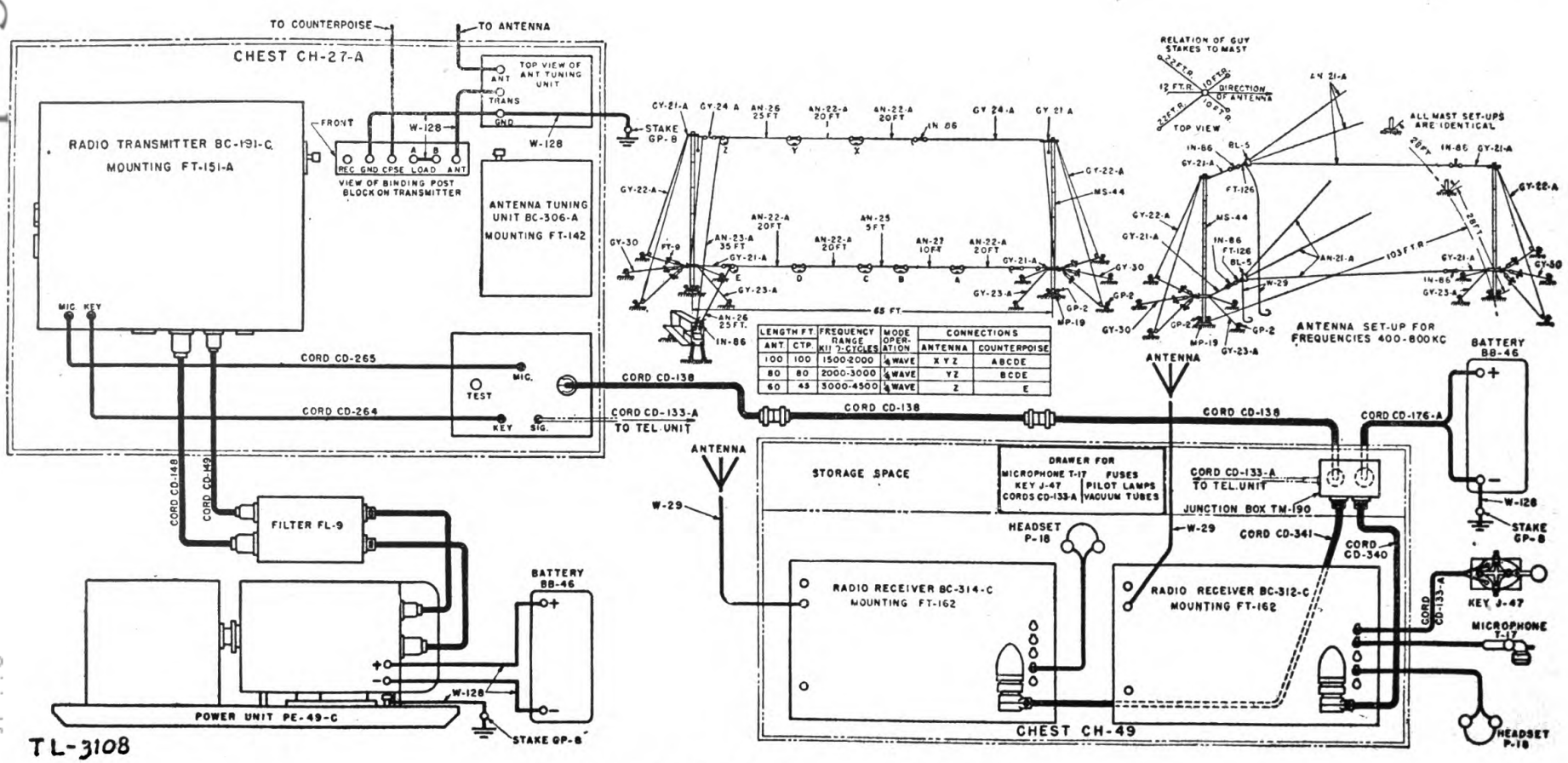


FIGURE 14.—Cording diagram, radio set SCR–177–B.

Original from UNIVERSITY OF CALIFORNIA

be found necessary to locate the chest so that the right end of the chest is the natural point for the lead-in wires to be attached. After the erection of the antenna is completed the transmitter chest may be moved to facilitate the proper tension in the lead-in wires.

(2) When the above operations are complete the OFF ON switch should be set in the OFF position. The TONE CW VOICE switch should be set in the CW position. The front cover of the tube compartment should be removed to see that the AC DC switch is in the DC position (see fig. 4).

d. Power unit PE-49-C.—(1) The power unit should be located on firm ground as far as possible from the transmitter chest and in such direction as to be away from the intended location of the receiving equipment. ***Caution:*** The use of this equipment, particularly radio transmitter BC-191-C and power unit PE-49-C, involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside the transmitter with the high voltage supply cord attached. The three ground stakes GP-8, as indicated in figure 14, should be installed and connected to the equipment before the following sequence of operations is undertaken:

(*a*) Attaching the cords of the radio set to their respective sockets.

(*b*) Starting the power unit.

(2) To install the power unit PE-49-C for service the following servicing operations are required (see fig. 9):

(*a*) *Crankcase lubrication.*—Fill the crankcase reservoir with clean "Mobiloil" Arctic SAE 20 or the equivalent. The oil level is indicated on the bayonet oil level gage incorporated in the filler plug. Old or dirty oil should first be removed by unscrewing the drain plug. Both the drain plug and filler plug are attached to the motor frame by chains.

(*b*) *Oil bath air filter.*—Fill the oil bath air filter with a clean oil SAE 20 or lighter to the level stamped OIL LEVEL on the outer shell of the removable unit. The unit is normally stored on a machine-screw pin located in the storage compartment (see par. 14). ***Caution:*** Remove the oil bath air filter from storage, keeping it in a horizontal position, in order that any oil left in the unit will not be spilled into the storage compartment. The unit is normally drained of oil after each period of use, and usually some residue of oil remains.

(*c*) The gasoline tank should be filled with gasoline and the sediment trap examined for water and solid particles. A valve located above the sediment trap is closed by turning in a clockwise direction

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

until the limit of rotation is reached. ***Caution:*** The various needle valves and adjusting screws located on the power unit may be damaged by unnecessary force. Adjusting force should be limited to a moderate force as applied by thumb and forefinger. The sediment trap is removed by loosening the knurled nut located below the glass sediment chamber, holding the glass with one hand and loosening the nut with the other. The trap should be cleaned, if necessary, and immediately replaced.

(*d*) The spare storage battery BB–46 should be connected to the battery charging terminal posts by means of the wire W–128. The battery is now in a double purpose location. It may be used to act as a starting battery for the power unit. Once the power unit is in operation at full speed, the battery is also properly connected to receive a charging current from the generator, when the field switch is closed. ***Caution:*** Make sure that the polarity markings of the battery are in exact agreement with the polarity markings on the power unit. A reversal of polarity might cause serious damage to the generator and control box and fuse FU–13 would probably be blown.

e. Receiving equipment.—The receiver chest should be located as far as possible from the transmitter chest and transmitting antenna structure in the opposite direction from the power unit (300 feet of cordage is provided in the three sections of cord CD–138). The chest should be mounted on its legs and the front cover opened to provide an operating table. Battery BB–46 should be located near the chest. Key J–47, microphone T–17, and headset P–18 should be connected into the circuits of the receiving equipment as shown on the cording diagram (fig. 14). A short antenna (approximately 50 feet) should be erected with wire W–29 using any convenient support, such as trees, buildings, or poles, and connected to the antenna binding post of radio receiver BC–312–C. A similar antenna should be connected to radio receiver BC–314–C. ***Caution:*** Do not attempt to use the same antenna for both receivers simultaneously. A ground stake GP–8 should be driven into the ground near the battery BB–46 and connected to the negative terminal of the battery using wire W–128. Cords CD–138 and CD–176–A, as shown on the cording diagram, are then connected.

f. Intercommunicating system (fig. 14).—The cording circuits and jack panel located in the transmitting chest, and the junction box located in the receiving chest make provisions for the attachment of the telephone EE–8 by the use of the cord CD–133–A at each chest. The telephones are not components of this radio set and must be secured

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

from the supply of such items furnished the organizations which use this radio set. When installed this intercommunicating system provides for communication between the receiving chest and the transmitting chest.

21. Antenna installations.—*a. General.*—This radio set is provided with components such as to make possible the erection of either one of two transmitting antennas. In the erection of either antenna a minimum of two men will be required. The equipment required except for the mast sections MS-44 is stored in chest CH-30 in the following manner:

(1) In the top long compartment are eight reels RL-3 wound as follows:

(*a*) Four reels on each of which are wound the three guys GY-22-A, GY-23-A, and GY-30.

(*b*) Two reels on each of which are wound (concurrently) three long antennas AN-21-A with the connectors M-6 outermost.

(*c*) One reel on which are wound the components for the antenna and counterpoise of the inverted L-antenna. If the unreeling is started at the transmitting chest and the operator proceeds to the home mast and then to the distant mast, the components for the antenna (top) will have been unreeled on the ground. On the return trip over the same route in the reverse order the counterpoise elements will be unreeled. The sequence of items stored on this reel is as follows, beginning with the outermost item: AN-23-A, IN-86, AN-26, IN-86, AN-22-A, IN-86, AN-22-A, IN-86 and a section of rope RP-3, the antenna (top); and a section of rope RP-3, IN-86, AN-22-A, IN-86, AN-27, IN-86, AN-25, IN-86, AN-22-A, IN-86, AN-22-A, IN-86, and AN-26, the counterpoise. These antenna sections are so assembled that the short leads equipped with a Fahnestock clip (or equivalent) are toward the home mast when unreeled.

(*d*) One reel on which are wound two guys GY-24-A.

(2) Below the reels are the guy stakes, ground stakes, hammers, spare rope, and mast bases.

(3) Below the stakes are the chest legs. The legs to chest CH-27-A may be stored here or on the back of chest CH-27-A.

(4) In the small end compartment are the guys GY-21-A, connectors BL-5, spare blocks FT-127, spare harness snaps, and miscellaneous small items.

(5) The inverted L-antenna (fig. 16) is used when transmitting on frequency assignments between 1,500 and 4,500 kc., inclusive. In this frequency range the optimum radiation is best secured by making changes in the antenna and counterpoise as well as in the antenna

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

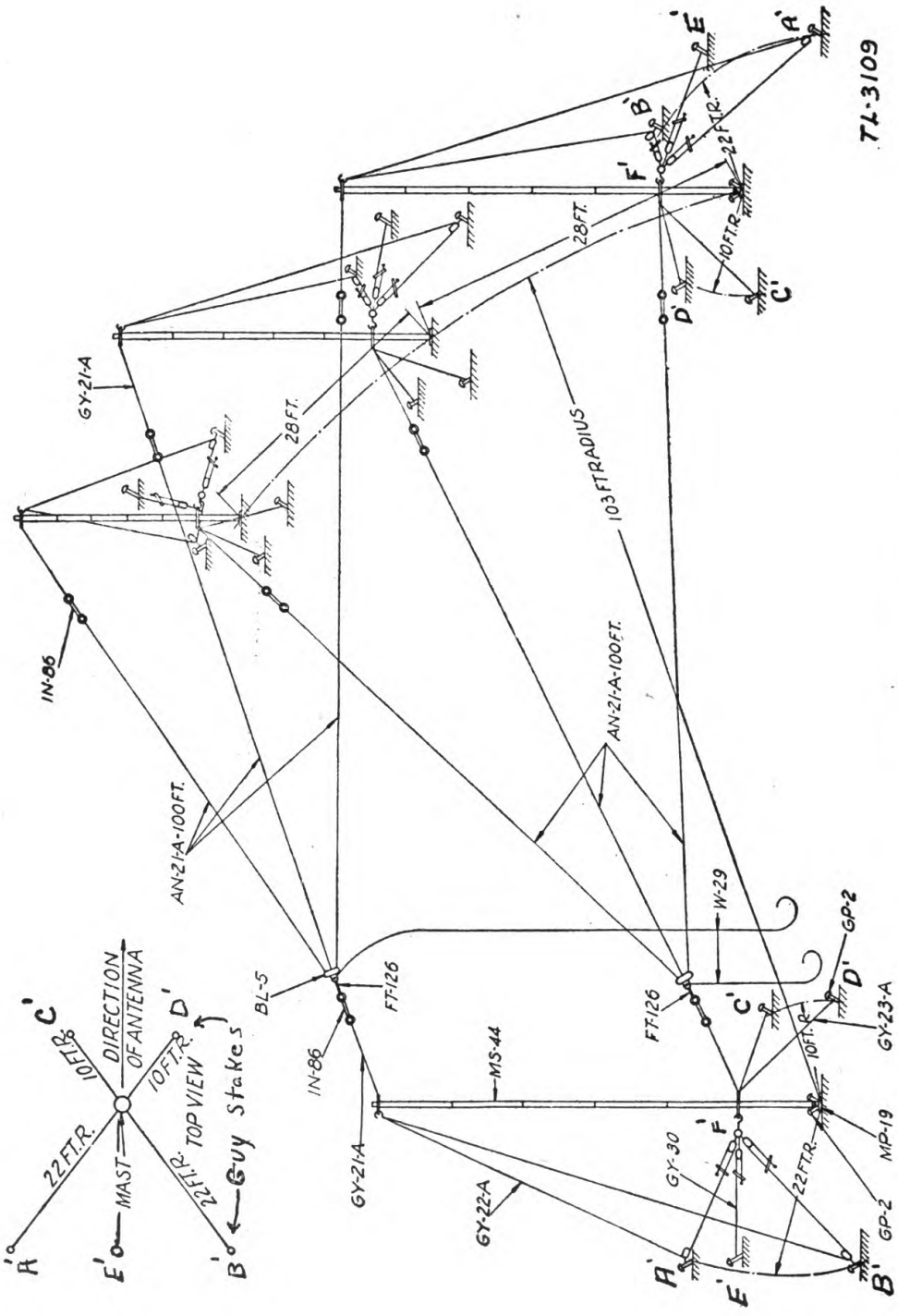
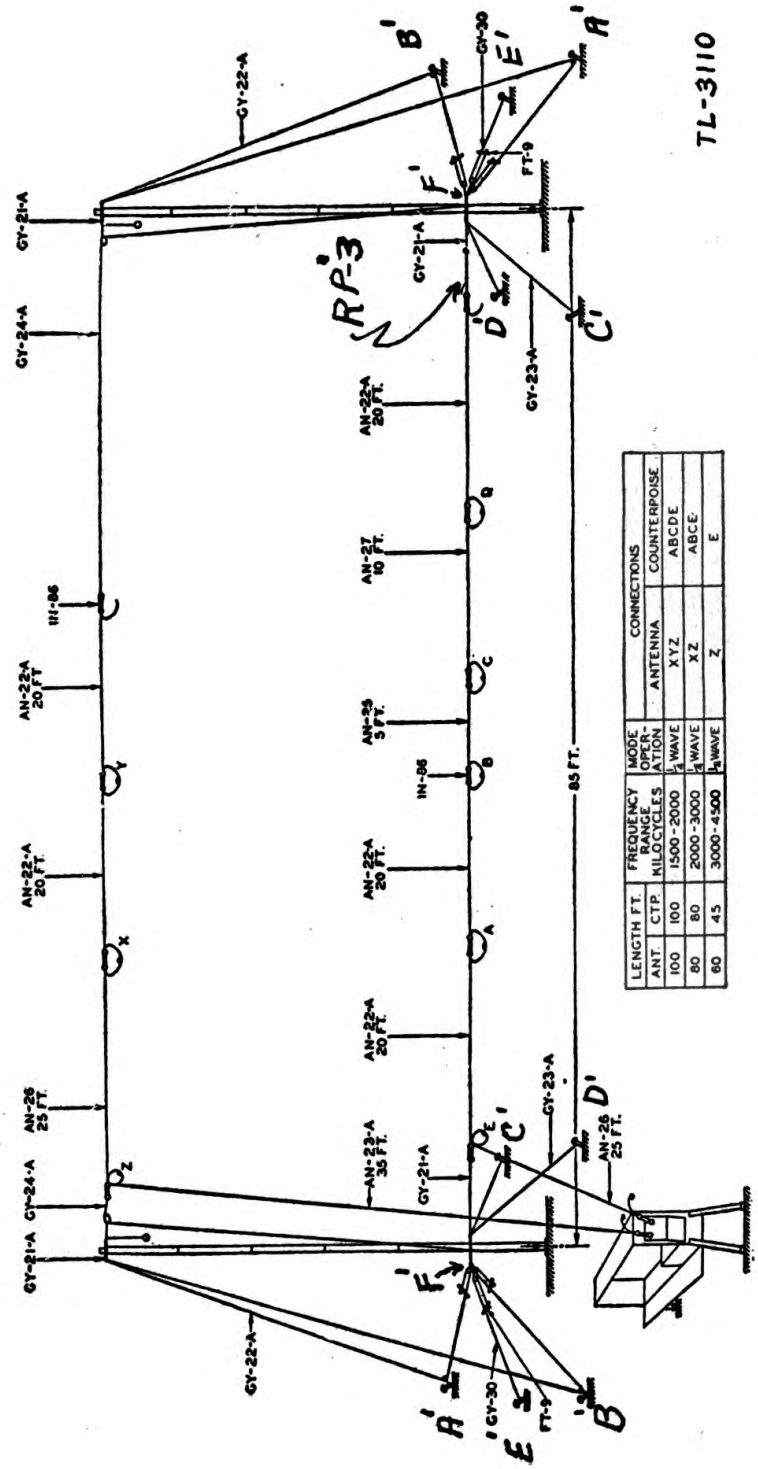


FIGURE 15.—Crowfoot antenna (low frequency).

Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA



LENGTH FT.		FREQUENCY RANGE KILOCYCLES	MODE OPERATION	CONNECTIONS	
ANT.	CTP.			ANTENNA	COUNTERPOISE
100	100	1500-2000	¼ WAVE	XYZ	ABCDE
80	80	2000-3000	¼ WAVE	XZ	ABCE
60	45	3000-4500	¼ WAVE	Z	E

FIGURE 16.—Inverted L-antenna with frequency connection chart (high frequency).

Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

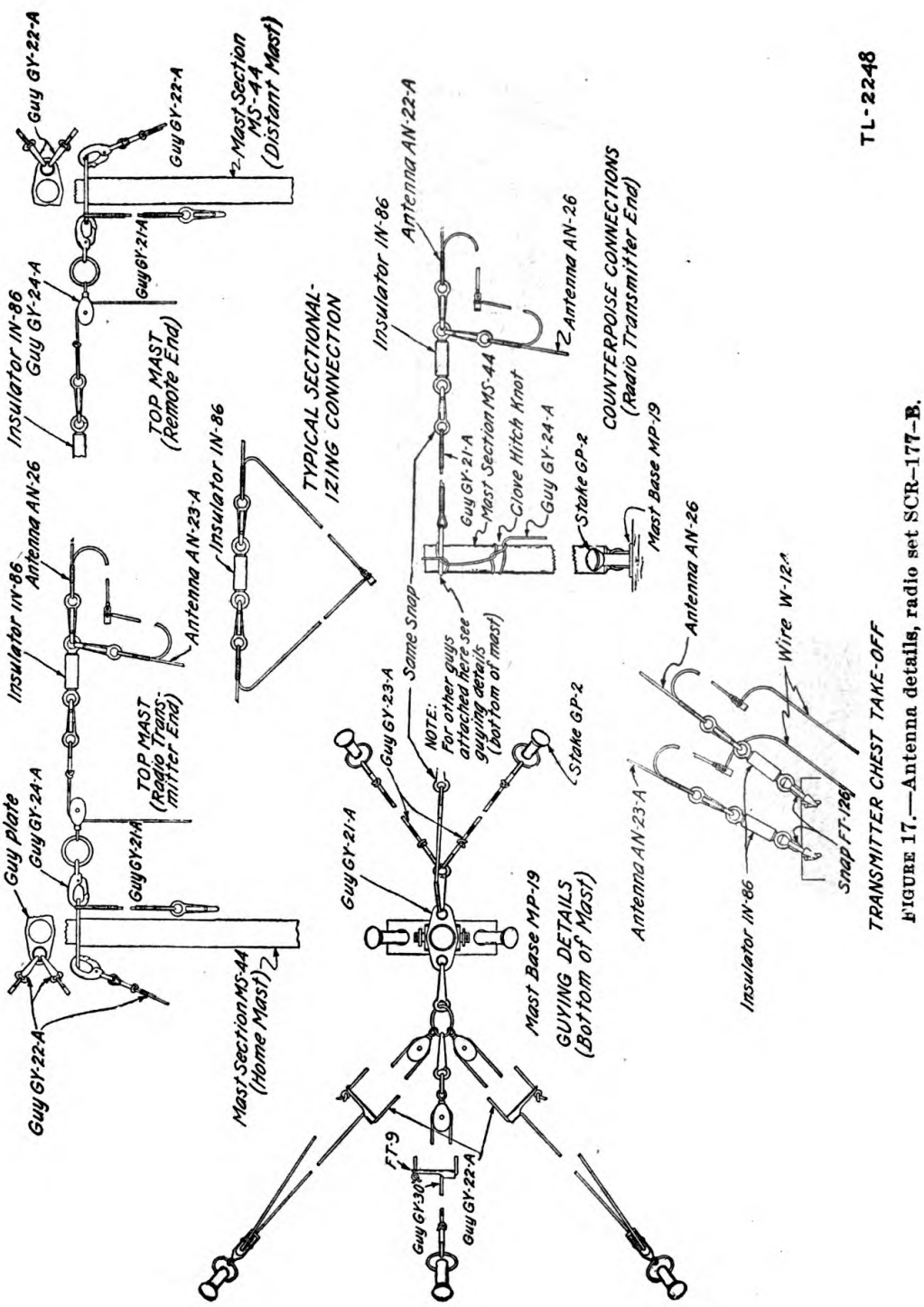


FIGURE 17.—Antenna details, radio set SCR-177-B.

Generated on 2015-09-24 19:02 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

tuning equipment. The inverted L-antenna is so constructed as to facilitate these changes readily.

(6) The crowfoot antenna (fig. 15) is used when transmitting on frequency assignments between 400 and 800 kc., inclusive. This antenna has sufficient capacity that over the frequency range for which it is intended the antenna tuning equipment provides all necessary tuning facilities.

b. Inverted L-*antenna.*—Figure 16 shows the inverted L-antenna erected, and figure 17 shows some details of the assembly of the components of the same antenna. The duralumin mast sections MS-44 are employed six to a mast in making up the two masts. The guying of each mast is accomplished by means of the guys GY-30, GY-22-A, and GY-23-A. The antenna and counterpoise are each made up of shorter component sections as follows:

(1) Beginning at the distant end, the sequence of antennas AN-22-A, AN-22-A, AN-26, and the lead-in AN-23-A form the antenna (top).

(2) Beginning at the distant end, the sequence of antennas AN-22-A, AN-27, AN-25, AN-22-A, AN-22-A, and the lead-in AN-26 form the counterpoise. One end of each short antenna section is equipped with a lead wire about 1 foot long terminated in a Fahnestock clip and the other end with a lead wire terminated in a bare tinned end. This provision makes it possible to adjust readily the operating length of the antenna and counterpoise as required by different operating frequencies. The lay-out of the component sections should be such that the lead wire having the Fahnestock clip will be toward the home mast. The antenna is raised and lowered by means of guy GY-24-A. This facilitates the rapid reconnection of the antenna components as required by frequency changes. For detailed description of each of the antenna components see paragraph 16.

c. Erection of inverted L-antenna.—(1) The antenna components of the inverted L-antenna as described in *a* and *b* above should be assembled and placed on the ground near chest CH-30 in two groups, one as required for operations at the home mast, and the other as required for the erection of the distant mast.

(*a*) The first group will contain—

2 guys GY-21-A.
1 mast base MP-19.
7 stakes GP-2.
1 reel (antenna and counterpoise).
1 reel (guys GY-21-A, GY-30, and GY-23-A)
1 reel (guys GY-24-A).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:17 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

6 mast sections MS-44.
1 hammer HM-1.

(*b*) The second group will contain—
2 guys GY-21-A.
1 mast base MP-19.
6 mast sections MS-44.
1 reel (guys GY-21-A, GY-30, and GY-23-A.
7 stakes GP-2.
1 hammer HM-1.

Caution: Operation at night will require the use of a fixed routine in connection with the erection of antennas, otherwise small items will be misplaced and lost. During the progress of the erection of an antenna, place empty reels, hammers, stakes, and similar items near a convenient mast base until the progress of the installation makes a more secure disposition of loose items practical.

(2) Having determined the line of the antenna and the position of the home mast, mark the position of the home mast and pace off 85 feet in the direction of the distant mast. At each position, stake a mast base M-19 with the wings of the ground plate of the mast base at right angles to the line of the antenna. The guy stakes for each mast should now be located and driven into place so as to point away from the mast with which they are associated. Figure 15 shows a detailed view of the stakes A', B', C', D', and E' in relation to the mast and the line of the antenna. Stakes C' and D' are located by hooking the ring of GY-23-A over the mast base stake nearest the intended position of stake C' or D' and going out along the line of the guy GY-23-A to the 10-foot marker. This marker is a woven-in thread found on one branch of guy GY-23-A. On the prolongation of the lines formed by the stakes C' and D' drive the stakes A' and B' 22 feet from the mast base. A convenient method of locating stakes A' and B' is as follows:

(*a*) Assemble the mast sections and guy GY-22-A on the mast base with the mast horizontal on the line of the antenna. Connect the guy GY-22-A to the top guy plate. Make no connection to the lower guy plate.

(*b*) The operators now make a triangle of the guy GY-22-A with the apex at the top guy plate allowing the rope of the guy to run through their hands until they are positioned at approximately the points where stakes A' and B' should be driven.

(*c*) The exact position of the two operators is still further adjusted until the blocks and harness snap intended for the lower guy plate in the erected antenna are on a line which is the prolongation

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:17 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

of the mast through the base point. The operators should now be equally distant from the above-mentioned blocks and at the same time equally distant from the mast base, 22 feet in the latter case. If lines were drawn between each operator and the mast base an angle would be formed which would be somewhat less than 90°. Assemble the mast sections on the ground hinged to the mast base, and so that each mast points toward the other. Attach one GY-21-A at the top of the mast, the other GY-21-A at the top of the first mast section having been put in place before the assembly of mast sections. Attach the guy GY-24-A to the guy plate at the top of the mast. Make the harness snap fast to the guy plate at the point *F'* and the free end of the same guy fast at the same point.

(3) The operators should then take positions as indicated in figure 18①. The operator at the base of the mast should take the block and hook of the guy GY-21-A and exert tension on the guy ropes. The operator at the top of the mast, as it lies on the ground, should raise it to his full height and "walk the mast up" as he proceeds toward the base of the mast. The sequence of operation is that shown in figure 18①, ②, and ③. When the mast is in a vertical position the block and hook of guy GY-22-A is made fast to the guy plate at the top of the first mast section. By the adjustment of the rope fasteners FT-9 attached to the guy GY-22-A the guy is made the proper length to hold the mast vertical. Guy GY-30 is now attached and adjusted.

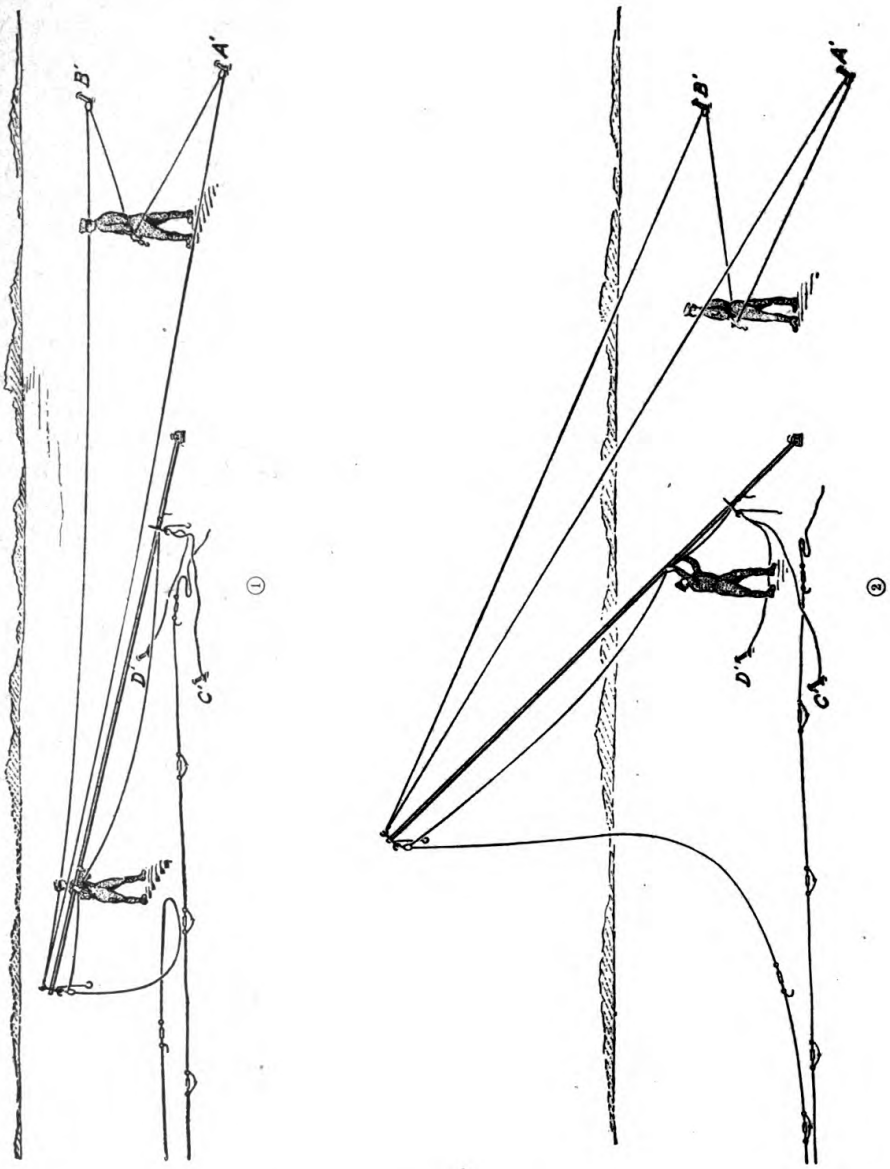
(4) Having erected the other mast in a similar manner, the antenna is attached to the snap of the guy GY-24-A halyard, and by the adjustment of the halyards at each mast the antenna is raised. The antenna and counterpoise components should not be unreeled until the erection of the masts is complete. Avoid too much tension on the antenna in the final adjustment of the halyards. A foot or two of sag is to be expected. Before the antenna is raised, the frequency assignment on which the station is to be opened should be determined and the proper connections made at Z, X, and Y as in the connection chart of figure 16.

(5) The counterpoise is now attached. In extreme cases it may be necessary to slack off on the guys GY-21-A in order to snap the counterpoise in place. The counterpoise should now be connected at A, B, C, and D as indicated in figure 16. ***Caution:*** The duralumin mast sections will stand an enormous load longitudinally, but they can be seriously damaged if the antenna is erected so that they are subjected to severe lateral stresses which will be indicated by excessive bending in the process of erection. If the equipment is to remain in operation for any length of time or if there is danger of

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:17 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

traffic through the antenna area, several streamers made from long strips of white rags should be conspicuously tied to the counterpoise and guy ropes.



d. Crowfoot antenna.—(1) The components of the crowfoot antenna should be assembled into groups as needed at the four mast positions as follows:

(*a*) At the home mast will be needed—

2 guys GY–21–A.
6 mast sections MS–44.
1 mast base MP–19.
7 stakes GP–2.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

2 reels (AN-21-A).
1 reel (guys GY-22-A, GY-30 and GY-23-A).
2 hammers HM-1.
2 connectors BL-5.
2 insulators IN-86.

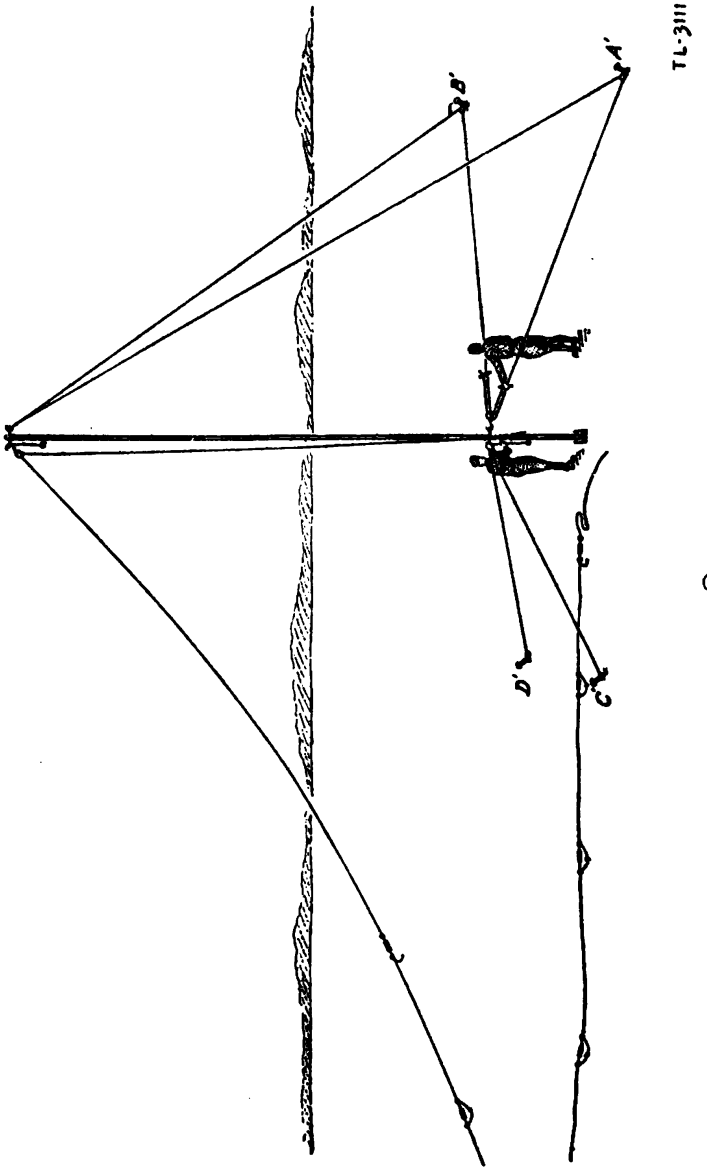


FIGURE 18.—Erection of antenna.

(*b*) At each of the three distant masts will be needed—
2 guys GY-21-A.
6 mast sections MS-44.
1 mast base MP-19.
7 stakes GP-2.
1 reel (guys GY-22-A, GY-30, and GY-23-A).
2 insulators IN-86.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(2) An examination of figure 15 of the crowfoot antenna indicates that the distant masts are on a 103-foot radius from the home mast and that the distant masts are approximately 28 feet from each other. The following assembly of parts comprises a convenient measure for the 103-foot radius specified above: GY-21-A, IN-86, BL-5, AN-21-A, IN-86, and GY-21-A. Care is needed to locate the mast bases properly for the masts in order that the antenna will have equal tension in its three branches. The guying of the masts is the same as for the inverted L-antenna, with the exception that guy GY-24-A is not used. The absence of halyards makes it necessary that the antenna sections are attached by means of the connector BL-5, insulator IN-86, and guy GY-21-A to the top of the mast at the time that the mast is raised. The home mast should be raised first and the middle one of the distant masts raised next. The distant ends of the antenna sections should each be attached prior to the raising of the individual masts. No standard lead-in wires are provided for the crowfoot antenna, hence suitable lengths of wire W-29 should be prepared by the operating personnel in advance of the erection of the antenna and attached to the connectors BL-5. Care should be exercised that equal tension and sag are present in the three branches of the antenna and counterpoise and relocation of distant mast bases may be required to secure a symmetrical structure. Under adverse circumstances it may be necessary to slack off on guys GY-22-A and GY-30 in order to snap the counterpoise into position and to readjust the guys later.

22. Checks and adjustments prior to operation.—*Caution:* The operation of this equipment involves the use of high voltages which are dangerous to life. Operating personnel will observe safety regulations at all times. Do not change fuses or make adjustments inside the equipment with the high voltage supply on. Ground stakes GP-8 should be driven into the ground and the jumper of wire W-128 securely fastened to the ground posts of the power unit, transmitting equipment, and receiving equipment before the cording is initiated and the power unit is started. If it is necessary to remove the front cover plate of the control box of the power unit PE-49-C to make adjustments, the high voltage circuits should be covered to avoid any accidental contact. (Dry paper or cloth or other insulating material can be used.) Always remember that with the set corded, the power unit operating, the field switch closed, and the transmitter key open, *high voltage* is present in the transmitter even though there is no reading on the total plate current meter. Do not make or maintain any connection between the transmitter and power

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

unit unless all duplicate unused sockets are covered by socket caps with cases snapped completely into place.

a. Check.—Make the detailed inspection of the installation and equipment as prescribed in paragraph 36 and correct where necessary.

b. Adjustments prior to operation.—Install the equipment as for operation (see cording diagram, fig. 14), *less* the antenna, and *less* the cord between the power unit and the transmitter that carries the high voltage cord CD-149. Set the transmitter OFF ON switch to the OFF position.

(1) The adjustment of the gasoline engine of the power unit PE-49-C for operation is dependent upon a number of factors such as the type and quality of fuel used, local temperatures, running speed desired, load, and operating temperature of engine, particularly of the fuel intake system. For detailed information on the performance of the fuel systems of gasoline engines see TM 10-550. The adjustment of the gasoline engine is made as follows:

(*a*) Check and accomplish the installation of the power unit for service as prescribed in paragraph 20*d*, and set the governor spring on the next to the highest notch on the governor adjustment arm (see fig. 11).

(*b*) Fully open the fuel supply line valve located just below the gasoline tank by counterclockwise rotation.

(*c*) Set the battery charging resistor for maximum resistance. This is accomplished by maximum counterclockwise rotation of the control located beneath the meters on the control box (see fig. 12).

(*d*) Close the needle valve (see fig. 11) fully by clockwise rotation and reopen, giving the needle valve one and one-fourth counterclockwise rotations.

(*e*) Close the air bleed adjustment screw (fig. 11) by clockwise rotation and open two and one-half turns.

(*f*) Close the choke valve (fig. 11) by a clockwise rotation and step on the starter switch (fig. 9). The generator now is acting as a series motor from power obtained from battery BB-46 and in event that the engine is very cold or stiff, closing the field switch located on the control box will give some additional power. This should rotate the engine and cause the proper mixture of fuel to be taken into the cylinder. The magneto, an integral component of the engine, causes timed ignition at starting and running speeds and enables the engine to run under its own power. ***Caution:*** The closing of the field switch as a starting means also causes the high voltage developed in the generator to appear as soon as the engine starts.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

NOTE.—In event that no battery is available to serve in starting, the rope starter of the engine is used. Remove the rope starter, which has a wooden handle attached to one end and a knot to the other, and face the power unit from the engine end of the assembly. Slip the knotted end of the rope into one of the grooves of the rope starting pulley so that the knot lies outside of the pulley and wrap the rope *clockwise* in the groove until the wooden handle is just conveniently distant from the grooved wheel. A vigorous pull on the rope will now spin the engine and perform an operation similar to that indicated in (*e*) above. Repeat until the engine starts, and if necessary, readjust carburetor and choke.

(*g*) As soon as the engine starts to run, immediately open the choke valve by a counterclockwise maximum rotation and allow the engine to run a few seconds before initiating the following procedure.

(*h*) Set the field switch on OPEN if it was closed under (*e*) above and further adjust the needle valve in one direction or another until the engine takes up its most rapid running speed.

(*i*) Adjust the air bleed adjustment screw in a manner similar to that in (*h*) above. This adjustment will not be critical when there is no load on the generator and the fine adjustment of this control and that of the needle valve will have to be continued when the adjustment of the transmitter has progressed sufficiently that tone operation may be used. A properly adjusted motor will run at a uniform speed, whereas an improperly adjusted motor will *hunt*, where hunting is defined as a cyclic variation in speed.

(*j*) A small button protrudes through a hole in the blower housing on the side opposite the carburetor assembly. This button when depressed short circuits the ignition system of the power unit and may be used to stop the engine. Apply pressure until the engine comes to a stop.

(2) Adjustments to the generator circuits are accomplished as follows:

(*a*) Remove the battery connections from the terminals of the control box.

(*b*) Set the field switch in the OPEN position.

(*c*) Examine the armature of the voltage regulating relay (see fig. 12). The armature throw should be somewhat less than 1/32 of an inch. Some clearance is necessary for the proper functioning of the control. Adjustment of the clearance is accomplished by loosening the lock nut associated with the armature stop screw and adjusting the armature stop screw until the proper clearance is obtained.

(*d*) Having accomplished the adjustment indicated in (*c*) above, tighten the lock nut associated with the armature stop screw.

(*e*) Set the field switch on the CLOSED position and note the generated voltage indicated on the voltmeter IS-58 located on the control

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

box. ***Caution:*** There is now a high voltage dangerous to the life of the operating personnel at various points inside of the control box and at the extremities of such cords and equipment as are corded to the socket SO-39 marked TRANS-PL-59. Operating personnel

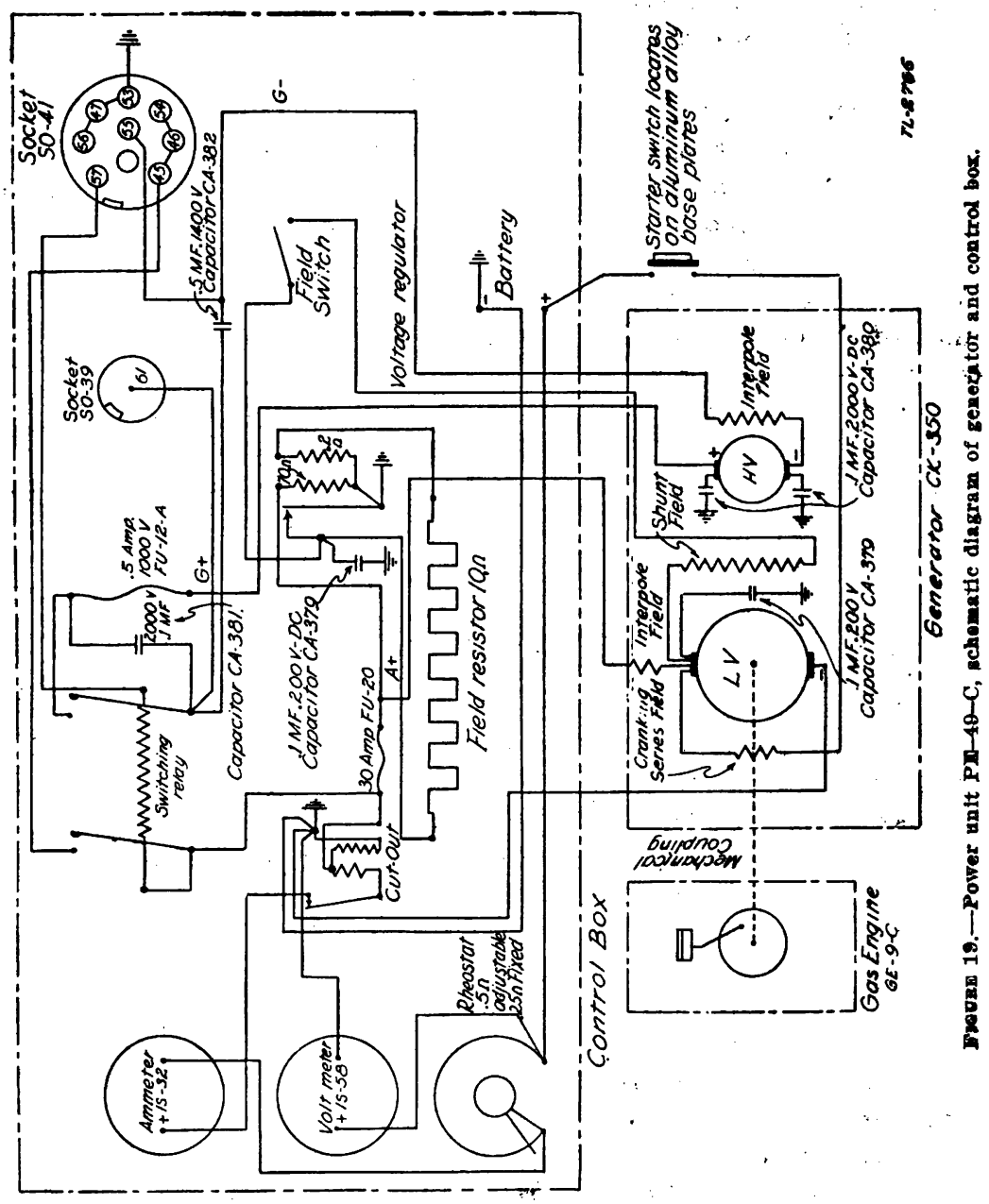


FIGURE 19.—Power unit PE-49-C, schematic diagram of generator and control box.

should use the greatest caution at all times in reaching into the control box when the field switch is closed (see fig. 19.)

(*f*) The open circuit low voltage of the generator with the engine running at the standard operating speed of 2,600 r.p.m. should be adjusted to 14.6 volts. This is accomplished by turning the voltage

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

regulator adjustment screw until the desired voltage is obtained. A clockwise rotation of the adjustment screw lowers the output voltage.

(*g*) The reverse current relay (REVERSE CURRENT CUT-OUT) (see fig. 12) in the battery charging circuit should be so adjusted by means of the reverse current adjusting screw that the relay will not close the generator to the battery until the generator is delivering a voltage of not less than 13.5 volts. The voltage delivered by generators of a type similar to that used in power unit PE–49–C is directly proportioned to the speed of rotation of the generator. With the break contacts of the voltage regulating relay blocked open and the make contacts of the reverse current relay blocked in the make position adjust the speed of the gasoline engine so that the voltage indicated on the voltmeter IS–58 is 13.5 volts. Fine adjustment of the engine speed may be accomplished by means of the governor adjusting screw (see fig. 11) used in conjunction with speed notches of the governor arm. When the voltage has been adjusted to 13.5 volts free the armature of the reverse current relay. One of two indications on the voltmeter will now be apparent, either zero volts or 13.5 volts. If the indication is zero rotate the reverse current adjusting screw in a counterclockwise direction until the reverse current relay closes. When the indication is 13.5 volts rotate the reverse current adjusting screw in a clockwise direction until the voltmeter indication goes to zero and reset the reverse current adjusting screw slightly counterclockwise so that the reverse current relay again closes. The adjustment is complete. Remove the block from the armature of the voltage regulator and set the engine governor to a standard speed of 2,600 r.p.m.

(*h*) Reset the speed adjusting screw of the governor assembly to include about three-fourths of the possible tension on the governor spring and set the governor spring on the standard speed notch (see fig. 11).

(3) Adjustment of the transmitter filament voltages is accomplished as follows: Allow the power unit and spare battery BB–46 to operate with the battery on charge for about 30 minutes to be sure that a stable operating point is reached at 14.6 volts as read on the voltmeter of PE–49–C.

(*a*) Remove the front cover from the tube compartment, and place the a-c d-c switch in the d-c position. The d-c position will be used at *all times* when the transmitter is furnished power by the power unit PE–49–C. Also remove the 16 screws which fasten the transmitter top and remove the top.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*b*) At the top left of the transmitter is the filament resistor connection board (see figs. 4 and 20). On the left end of the board are four rows of studs labeled as follows, beginning at the top of the board: COMP, CW FILAMENT, 14 VOLTS, and 12 VOLTS. On the right are three rows of studs marked (top to bottom) MOD FILAMENT, 14 VOLTS, and 12 VOLTS. There are links connecting various rows of studs together. Remove all links.

(*c*) Set the 12V 14.2V switch in the 12V position, set the TONE CW VOICE switch in the CW position, and set the CW FIL MOD FIL switch in the CW FIL position.

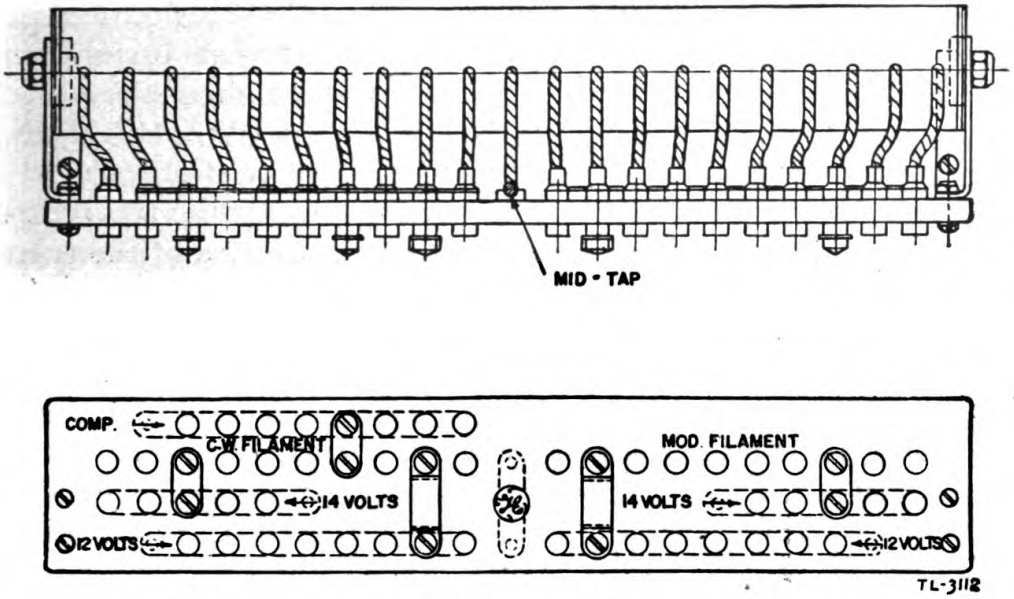


FIGURE 20.—Radio transmitter BC-191-C, filament resistor connection board.

(*d*) Connect a short link between a stud on the CW FILAMENT row and the stud directly under on the 14V row at the extreme right end of the 14V row.

(*e*) Connect a short link between a stud on the MOD FILAMENT row and a stud on the 14V row directly under at the very left end of the 14V row.

(*f*) Set the transmitter OFF ON switch in the ON position.

(*g*) With a screw driver or short piece of wire W-128 (or larger) connect between a stud on the CW FILAMENT row and a stud in the 12V directly under, beginning at the very right end of the 12V row. On each connection the c. w. filaments should light and the filament voltmeter should give a reading. Progress to the left, stud by stud, until a connection is found that causes the filament voltmeter to read slightly over 10 volts.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*h*) Set the transmitter OFF ON switch in the OFF position and connect a long link between the studs just located.

(*i*) Set the TONE CW VOICE switch on VOICE, and the CW FIL MOD FIL on MOD FIL position.

(*j*) Set the OFF ON switch in the ON position.

(*k*) In a manner similar to that in (*g*) and (*h*) above, beginning at the left end of the 12-volt row connect a long link between a stud on the MOD FILAMENT row and the stud directly under on the 12V row that will cause the filament voltmeter to read slightly over 10 volts.

(*l*) Set the CW FIL MOD FIL switch on CW FIL.

(*m*) Set the transmitter OFF ON switch in the ON position.

(*n*) The c. w. filament voltage will now be less than 10 volts and in a manner similar to that in (*g*) and (*h*) above, determine a stud on the COMP row and one directly under on the CW FILAMENT row which will cause the filament voltmeter to read slightly over 10 volts. As now adjusted the filament voltages for the transmitter will not require readjustment as the mode of operation of the transmitter is changed to c. w., tone, or voice signals. However, if it is not possible to secure the above adjustment it will be necessary to readjust the output voltage of the power unit PE-49-C (see *b* (2) (*f*) above).

(*o*) Restore the transmitter top and the front cover to the tube compartment.

(*p*) Set the field switch on the power unit PE-49-C to the OPEN position, and restore the cord CD-149 to the power unit and the transmitter.

c. When necessary, special adjustments as prescribed in paragraph 39 are made.

23. Operation in general.—*a. Interference.*—(1) Interference may be minimized by the use of c. w. operation and by the use of the crystal filter when receiving with the radio receiver BC-312-C.

(2) Power lines contribute a source of interference, particularly at the higher frequencies. This type of interference can be avoided by the selection of a location not in the vicinity of power lines.

(3) The several types of interference will usually have a characteristic noise and with some practice may be identified. A change in the location of the receiving antenna may in some cases aid in the elimination of interference, particularly if the noise source is nearby.

b. Net operation.—(1) *In net operation, all stations must be accurately tuned to the same frequency.* Frequency adjustments should

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:18 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

be made with the aid of a frequency meter. All tuning operations reflect more or less into the master oscillator circuit and a check on the final frequency when the transmitter and antenna are in resonance will aid in securing the exact frequency assignment. It is desirable that all stations in the net be tuned under similar circumstances as follows:

(*a*) Operate the power unit for a few minutes to allow the gasoline motor to stabilize its running speed.

(*b*) Load the generator with the filaments of transmitter lighted, and with the spare battery on charge.

(2) A warm-up period for the receivers at the same time that the power unit is stabilizing will aid in reducing frequency drift. The receivers of this radio set are very selective and careful tuning across the portion of the frequency band which contains the frequency assignment will aid in receiving the signals from a distant station in the net. The radio receiver BC-312-C should not be operated with the crystal phasing control set to include the crystal in the circuit during the preliminary search period for a desired signal. The radio receiver BC-314-C is *not* equipped with a crystal element.

c. Methods of operation.—(1) (*a*) C. w. operation will provide the greatest distance range and at the same time will give the least interference to nets operating on adjacent frequency assignments.

(*b*) Tone is well adapted to net operation where the extreme distance range is not desired, but causes more interference on adjacent channels.

(*c*) Operation on voice-modulated carrier has the least distance range and in addition causes the greatest interference on adjacent channels.

(2) The receivers of this radio set are designed to receive all three modes of transmission. The reception of c. w. is accomplished by the use of an auxiliary circuit of the receiver known as the c. w. oscillator which delivers a radio frequency voltage, adjusted to beat with the amplified i. f. signal produced by an incoming c. w. signal, and results in an audible tone of the difference frequency. Both receivers are equipped with provisions for either manual or automatic and manual volume control. The use of automatic volume control, a. v. c., for the reception of c. w. signals, particularly when the signal is weak and the background noise is high, is not recommended. Both receivers have slightly less sensitivity when the OFF MVC AVC control is set on AVC. The radio receiver BC-312-C only is equipped with a stage of crystal control which when

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

in use provides for a very narrow band of reception. Its use is best determined by practice.

d. Precautions.—(1) *Controls.*—Observe care in handling all of the controls. Most of the controls are equipped with stops to limit their movement. Forcing a control beyond its normal stop will seriously damage the equipment. This caution applies particularly to the receiver controls marked VERNIER, CRYSTAL PHASING, and VOL.

(2) *Serial numbers.*—The serial numbers of the transmitter tuning units and of the transmitter must be identical. Do not interchange transmitter tuning units with those of other transmitters.

(3) *Vacuum tubes.*—A marked decrease in the life of the transmitter vacuum tubes results when the plate power is applied to a vacuum tube with an undervoltage on the filament, and an overvoltage applied to the filament with or without plate power is detrimental. Check the filament voltages frequently and correct as necessary (see par. 22*b*(3)). In all cases use vacuum tubes marked with the Signal Corps type numbers in both the transmitter and receivers.

(4) *Band change switches.*—It is possible to stop the movement of a band change switch in between positions. Always stop a band change switch at a point where it definitely engages the desired band.

(5) *Cords.*—Avoid undue pulling or stressing of cords. The movement of the transmitting chest or receiving chest should not be attempted with cords attached. Likewise the removal of equipment from the chests should not be undertaken with cords attached. *At no time apply power to cords from the power unit while cording or uncording of equipment is being accomplished.*

(6) *SEND REC switch.*—The SEND REC switch located on the receivers should be set on SEND at such times as the transmitter is being keyed, and the receiver is set to receive at the frequency of transmission.

24. Transmitting controls (figs. 4 and 9).—*a. General.*—The controls located on the power unit afford control of the power required by the transmitter and include provisions for starting the power unit PE-49-C, and the adjustment of the operating voltages conducted to the transmitter. On the transmitter are located the controls and indicators necessary for the adjustment of the transmitter to authorized frequencies, modes of transmission, and keying, less side tone monitoring of the transmission. The remote keying of the adjusted transmitter is accomplished at either receiver through the cording circuits. Intercommunication between operators located

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

at the receiving chest and the transmitting chest may be established by the use of facilities included in the cording of this radio set and the use of telephone units EE-8. The latter is not a component of this radio set. Side tone for the monitoring of the transmissions is not furnished by the transmitter but by a receiver in chest CH-49 set to the frequency of the transmission.

b. Controls of power unit PE-49-C.—When the power unit PE-49-C is adjusted as prescribed in paragraph 22*b*(1) and corded to the transmitter, the output power conducted to the transmitter is controlled by the switching relay of the power unit (see *c*(8) below).

c. Controls and indicators on radio transmitter BC-191-C (figs. 4 and 5).—Transmission is accomplished or controlled by—

(1) An antenna and counterpoise connected to the ANT binding post and to the CPSE binding post. The respective binding posts are located on the output terminal strip (fig. 5). The output terminal strip is installed as indicated in paragraph 11.

(2) A thermocouple type 0 to 8 ampere radio frequency ammeter marked ANT CURRENT located in the upper right-hand corner of the front panel (fig. 4).

(3) An antenna inductance tuning dial marked ANT IND TUNING, M, used for inductively tuning the antenna. It is located immediately below the antenna current meter.

(4) An antenna circuit switch, marked ANT CIRCUIT SWITCH, N, used to accomplish the antenna circuit changes required for tuning the transmitter into various types of antennas. It is located directly below the antenna inductance tuning dial.

(5) An antenna capacity tuning dial, marked ANT CAP TUNING, O, located immediately below the antenna circuit switch. This control is used to adjust a tuning capacitor in the antenna circuit. It is provided with a locking mechanism so that its final position may be maintained.

(6) An antenna inductance switch, marked ANT IND SWITCH, P, used for obtaining large variations in antenna inductive loading. This switch is a five-position switch, each position corresponding to a tap on the inductance coil and is located in the lower right-hand corner of the front panel.

(7) A filament voltmeter switch, marked CW FIL MOD FIL, located to the left of the antenna circuit switch. It is used to transfer the voltmeter to either the modulator tube filaments or to the master oscillator and power amplifier filaments.

(8) A transmitter OFF ON switch located to the left of the filament voltmeter switch. It actuates the switching relay of the power

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

unit and controls the presence or absence of filament power and high voltage to the transmitter from the power unit.

(9) A 0 to 15-volt a-c d-c voltmeter marked FIL VOLTAGE located to the left of the OFF ON switch. This meter indicates the filament voltage of the modulator tubes or master oscillator and power amplifier tubes, as controlled by the CW FIL MOD FIL switch described above.

(10) A 0 to 500-milliampere d-c ammeter marked TOTAL PL CURRENT located to the left of the filament voltmeter. This meter indicates the plate current drawn by the radio transmitter and is used as a means for indicating resonance while tuning, adjustment of the modulator circuit, and proper loading of the power amplifier circuit.

(11) A three-position switch with a pointer for indicating TONE CW VOICE positions, respectively. This switch is located to the left of the plate current meter. It sets the transmitter for tone, c. w., or voice transmissions.

(12) A TEST KEY for keying the transmitter while tuning adjustments are in progress. This key is located in the left center of the transmitter and is a nonlocking push button.

(13) The calibration reset capacitor may be adjusted (see par. 39*d*) by a neutralizing tool inserted through a small port located to the right of the TEST KEY. Its purpose is to bring the tuning controls of the assembled transmitter into agreement with the calibration chart, and is not normally adjusted during routine operation.

(14) Located in the tube compartments are the following controls which do not usually require adjustment during routine transmission, but ready access may be had to them by the removal of the tube compartment shield:

(*a*) In the left-hand tube compartment is the input level control marked INPUT LEVEL. It is used to adjust the input to the speech amplifier when voice signals are being used.

(*b*) In the upper left-hand corner of the right compartment is the control marked S. A. BIAS. This control is used to adjust the bias of the speech amplifier tube.

(*c*) To the right of the S. A. BIAS control is the control marked SIDE TONE. In the installation of radio transmitter BC-191-C as a component of radio set SCR-177-B, the side tone circuits are not corded to phone jacks and the setting of the SIDE TONE control is immaterial.

(*d*) To the right of the SIDE TONE control is a toggle switch marked 12V 14.2V. This switch should be set on the 12V position in

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

the installation of radio transmitter BC-191-C as a component of radio set SCR-177-B.

(*e*) Below the 12V 14.2V switch is a rotary switch marked AC DC. This switch provides the necessary circuit changes when it is desired to operate the tube filaments from an a-c power source. In the installation of radio transmitter BC-191-C as a component of radio set SCR-177-B, set the AC DC switch on the DC position.

(*f*) Below the SIDE TONE control is the control marked MOD BIAS. This control is used to adjust the bias on the modulator tubes.

d. Controls on transmitter tuning units.—(1) A band change switch located in the lower left-hand corner of the transmitter tuning unit marked BAND CHANGE SWITCH, A, is used to make the necessary circuit changes in the master oscillator circuit and power amplifier circuit to cover the frequency band of the tuning unit.

(2) The master oscillator tuning control is located in the upper left-hand part of the transmitter tuning unit. It is marked MO TUNING, B, and consists of two dial mechanisms and a lock. The dial mechanism used to select the frequency also acts as a vernier and is divided into 100 divisions. The flat fully exposed scale located to the left of the dial lock has 25 divisions and indicates hundreds while the so-called vernier indicates tens and units, as related to the column marked B of the calibration chart. The control is used to tune the tank circuit of the master oscillator circuit.

(3) The power amplifier tuning control located in the upper right-hand part of the transmitter tuning unit is marked PA TUNING, C. This control is used to tune the tank circuit of the power amplifier and is provided with a lock to hold its final setting. The dial calibrations are referred to in the column marked C of the calibration chart.

(4) The antenna coupling switch located in the lower right-hand side of the transmitter tuning unit, is a six-position switch marked ANT COUPLING SWITCH, D. This coupling selects different taps on the antenna coupling coil.

(5) The control of the neutralizing capacitor is reached through a port located behind the calibration chart, and is adjusted as indicated in paragraph 39*b*. It is not adjusted in the normal operation of the transmitter.

e. Antenna tuning unit BC-306-A (figs. 6 and 29).—This unit is located in the transmitting chest and the adjustment of the unit as required by various operating frequencies is effected by the following controls:

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(1) A switch located on the top front of the unit, marked ANTENNA VARIOMETER SWITCH, F, functions to include or exclude the reactance of the unit in the antenna circuit, and various fixed amounts of the inductor in the antenna circuit.

(2) The dial marked ANTENNA VARIOMETER is the control of the variometer enclosed in the unit whereby small changes in the inductive tuning of the antenna circuit are accomplished.

f. Remote keying (fig. 21).—Located on the receiver panels are two jacks, the upper marked KEY and the lower marked MICRO. The tip connections of both jacks are connected together at the terminals marked N and U in the plugs PL-114 associated with each receiver. A circuit from this jumper may be traced through the terminal of the junction box TM-190, cord CD-138, to the tip of the MIC jack on the jack panel. This MIC jack is corded to the transmitter by cord CD-265 and completes a circuit which, when grounded by the key J-47 at either receiver, will operate the antenna switching relay and keying controls of the transmitter BC-191-C for either tone or c.w. transmission. Likewise the contact made by the control button of the microphone T-17 controls the keying of the transmitter when the microphone is plugged into the MICRO jack of either receiver. It will be noted that the keying circuit from the receivers for either tone, c. w., or voice is conducted to the tip contact of the MIC jack located on the jack panel in the transmitting chest, and that *the cord CD-265 carries all remote keying.* The cord CD-264 serves to key the transmitter from TEST KEY located on the jack panel *only.*

25. Transmitting procedure for c. w.—*a. General.*—The transmitter may be operated for c. w., tone, or voice transmission. *In all cases adjust the transmitter initially for c. w. transmission.* The transmitter should be approximately tuned before the power is turned on as follows:

(1) Select a transmitter tuning unit which covers the assigned frequency and plug it into the transmitter. The transmitter tuning units cover frequency as follows:

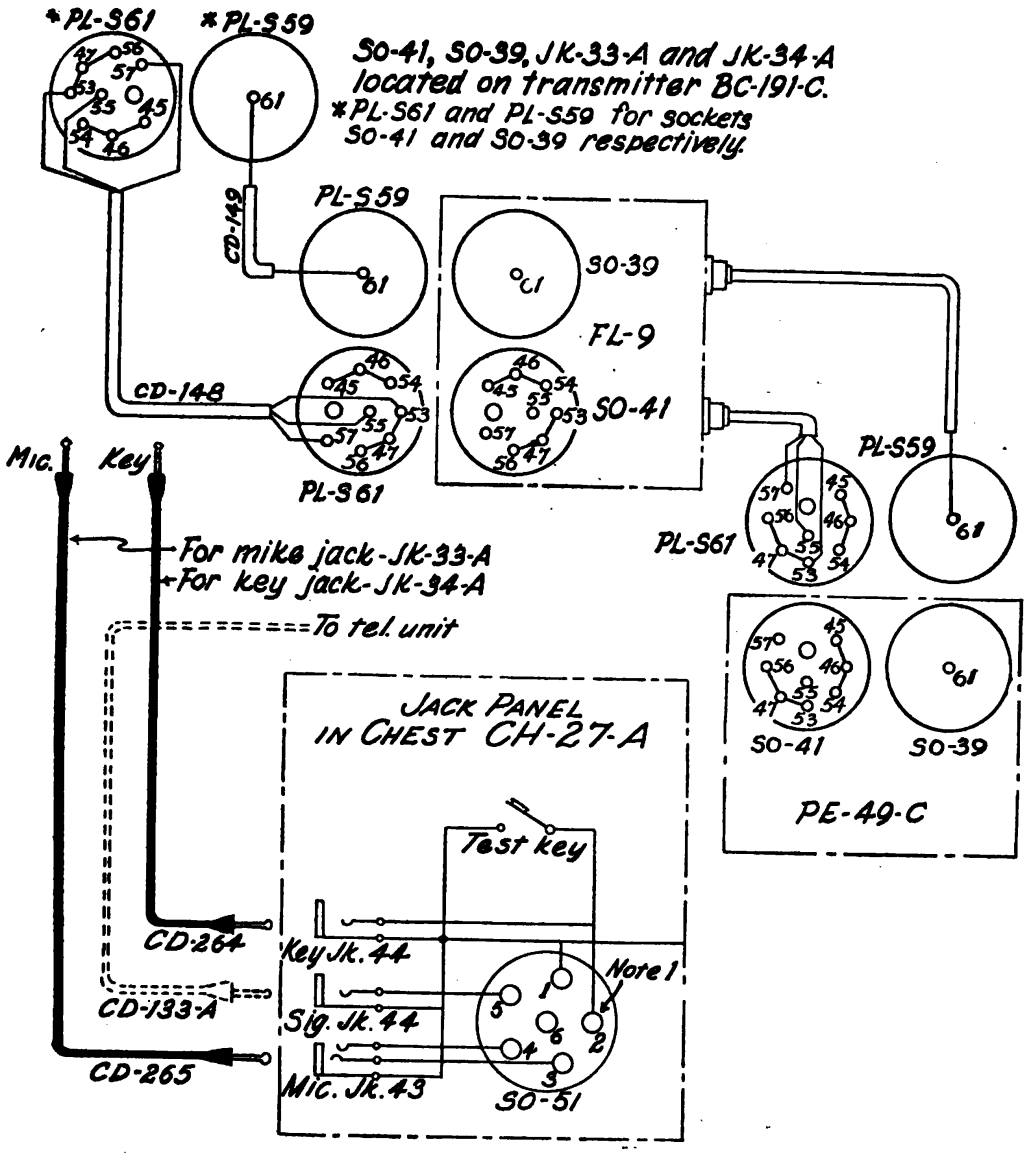
(*a*) TU-3-A, 400 to 800 kc.

(*b*) TU-5-A, 1,500 to 3,000 kc.

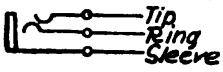
(*c*) TU-6-A, 3,000 to 4,500 kc.

(2) On the front panel of each tuning unit will be found a calibration chart. Of the several columns of data, there are four labeled from left to right, FREQUENCY, A, B, and C. If the frequency assignment is one of the frequencies contained on the chart, then the transmitter may be preset to frequency as follows:

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google



Note 1
Tip of J4 and J5 radio receivers BC-314-C and BC-312-C connected by jumper NU in plugs PL-114 for keying from receivers.
Cord CD-133-A is a component of SCR-177-B.
S0-40 is for plug CD-176-A.



Color code of cords CD-340, CD-341 & PL-114.	
D - Black	- 12
E - Green	- 16
J - Blue	- 20
V - Shield	- 18
H - Yellow	- 20
U - Red	- 16
T - Natural	- 12

FIGURE 21.—Cording diagram details, radio set SCR—177—B.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*a*) In the column marked A is a number opposite the frequency assignment. Set the BAND CHANGE SWITCH, A, to the number just determined.

(*b*) In the column marked B is a number opposite the frequency assignment. This number is the combined reading of the indicators

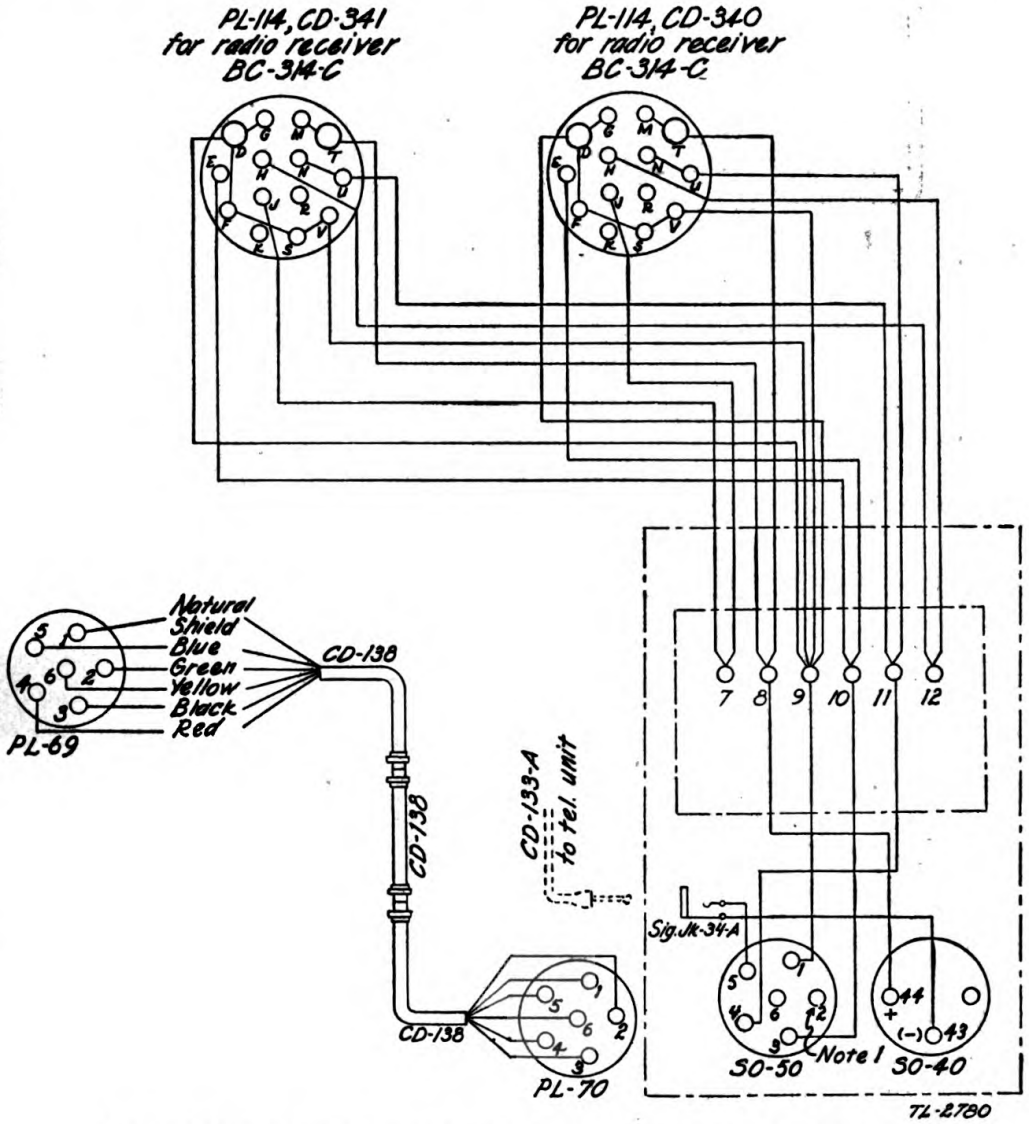


FIGURE 21.—Cording diagram details, radio set SCR-177-B—Continued.

on the MO TUNING control (see par. 24*d*(2). Set the MO TUNING control as indicated by the numbers just determined.

(*c*) In the column marked C is a number opposite the frequency assignment. This number is the reading on the control marked PA TUNING, C. Set the PA TUNING control on the number just determined.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*d*) Set the switch marked ANT COUPLING SWITCH, D, on position 1.

(*e*) If the exact frequency assignment is not contained on the calibration chart as a calibration point, an interpolation of the chart data will have to be made and checked with a frequency meter when power is applied to the transmitter.

(3) Depending upon the frequency assignment the following antennas should be erected:

(*a*) Crowfoot antenna, 400 to 800 kc.

(*b*) Inverted L-antenna, 1,500 to 4,500 kc. The inverted L-antenna is connected in accordance with the chart in figure 16.

b. Transmitter adjustment.—(1) Set the transmitter OFF ON switch in the OFF position.

(2) Check the cording against the cording diagram located on the chest CH-27-A.

(3) Start the power unit PE-49-C and adjust as directed in paragraph 22*b*.

(4) Set the transmitter OFF ON switch in the ON position. The filaments should now light and the filament voltmeter marked FIL VOLTAGE should read 10 volts.

(5) Press the TEST KEY on either the transmitter or jack panel located in the right end of the chest CH-27-A.

(6) Tune the power amplifier circuit to resonance by varying the PA TUNING control C until *minimum total plate current is indicated* on the TOTAL PL CURRENT meter. When this circuit is properly tuned the total plate current will be from 80 to 110 milliamperes.

NOTE.—The tabular data in column C of the calibration chart relating to the setting of the PA TUNING control is given as a guide in pretuning, and in *any case* the final adjustment of the transmitter and antenna tuning equipment may or will require a setting of the PA TUNING control somewhat different from that indicated on the calibration chart.

(7) If a frequency meter is available the exact frequency setting for interpolated frequency should be determined, and the power amplifier returned to the new adjustment of the master oscillator circuit as in (6) above.

(8) Set the OFF ON switch in the OFF position.

c. Antenna adjustments.—(1) The antennas authorized for radio set SCR-177-B are ¼ wave length, or somewhat less, for the frequency ranges associated with each antenna. The inverted L-antenna is reconnected in order to make it suitable for certain frequency bands (see fig. 16). Tables I and II below give approximate settings of the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:19 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

antenna tuning equipment for various frequencies. The tables can be used as a guide in tuning the antenna. Approximate antenna and plate currents to be obtained are also indicated.

TABLE I

(For frequencies between 400 and 800 kilocycles, using crowfoot antenna)

Frequency (kc.)	Antenna circuit switch N	Antenna variometer switch E	Antenna variometer F	Antenna inductance tuning M	Antenna inductance switch P	Antenna current (amp.)	Plate current (ma.)
400	3	3	40	0	(1)	2. 5	180
600	3	2	32	0	(1)	2. 9	190
800	4	1	(1)	20. 5	3	2. 8	190

1 Not in circuit.

TABLE II

(For frequencies between 1,500 and 4,500 kilocycles, using inverted L-antenna, and with antenna variometer switch E on position 1 or antenna tuning unit BC-306-A removed)

Frequency (kc.)	Antenna length (feet)	Counterpoise length (feet)	Antenna circuit switch N	Antenna inductance tuning M	Antenna inductance switch P	Antenna capacity tuning O	Antenna current (amp.)	Plate current (ma.)
1,500	100	100	4	10. 0	2	(1)	1. 9	180
2,000	100	100	3	17. 5	(1)	(1)	2. 2	175
2,000	80	80	4	12. 5	1	(1)	2. 6	210
2,050	80	80	3	35	(1)	(1)	2. 6	220
2,700	80	80	3	0	(1)	(1)	2. 4	210
3,000	80	80	2	17. 5	(1)	100	1. 6	180
3,000	60	45	3	25. 5	(1)	(1)	2. 5	210
3,500	60	45	2	32. 4	(1)	100	2. 5	210
4,000	60	45	2	20. 5	(1)	100	2. 5	220
4,500	60	45	2	7. 8	(1)	100	1. 85	190

1 Not in circuit.

(2) There are four antenna networks (see fig. 22) selected by the control N located on the radio transmitter BC-191-C, the adjustment and use of which are described below:

Caution: Continuously variable controls M, O, and F may be operated with the transmitter key closed and adjusted as in *b* above. *Operate all switches with the transmitter key open.*

(*a*) With the control N on position 1 the transmitter works into a resonant circuit, in which the high voltage built up across the an-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:20 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

tenna tuning capacitor is used to "voltage feed" the antenna. This circuit is generally used for high frequencies and fairly long antennas, and is seldom used in tuning the standard antennas of radio set SCR-177-B. The antenna feed circuit is maintained at resonance by means of control M, while the voltage fed to the antenna is varied by means of the control O and resonance is indicated by the ANT CURRENT meter. The current in the feed circuit is adjusted by the control D and should not exceed 6 amperes. The step by step tuning procedure is as follows:

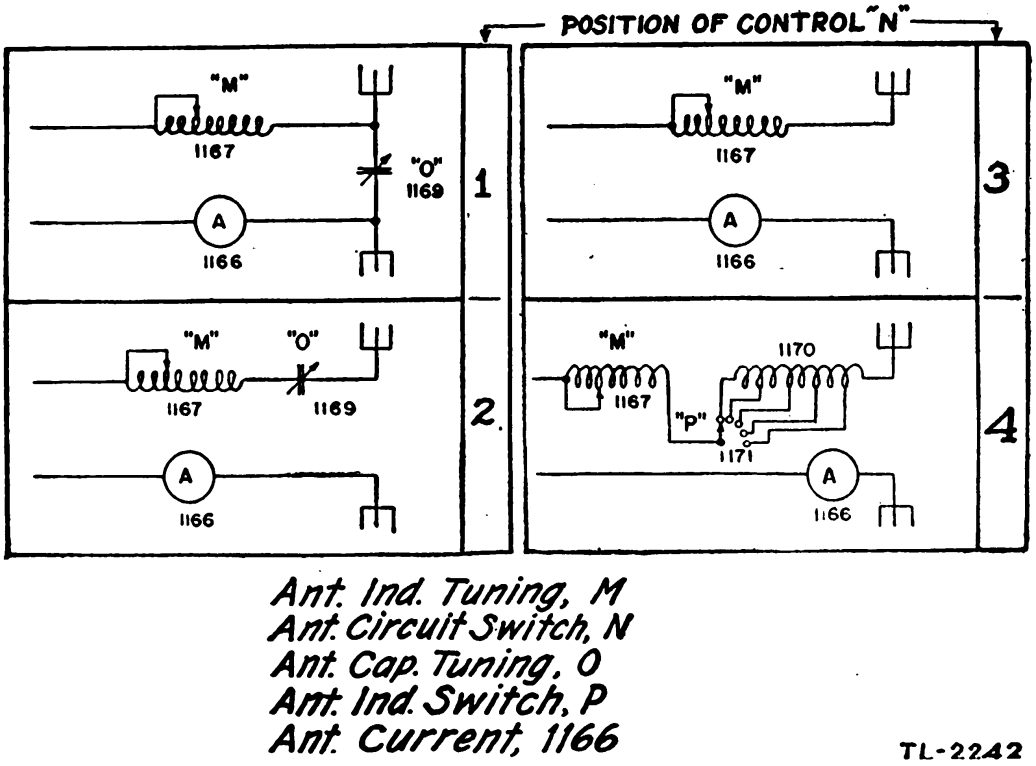


FIGURE 22.—Radio transmitter BC-191-C, functional diagram of antenna tuning equipment.

1. Set the control O at some arbitrary scale reading.
2. Resonate the circuit by means of the control M for a maximum reading on the antenna current meter.
3. Adjust the control D so that the antenna current reads slightly below 6 amperes.
4. Re-resonate the circuit as in 2 above.

(*b*) The above procedure is repeated until the proper power amplifier loading is indicated on the total plate current meter (200 to 220 ma. on c.w.). Under the same conditions of power amplifier load, the lower the dial reading on the control M and the lower the reading

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:20 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

on the antenna current meter, the more power will actually be delivered to the antenna.

(3) With control N on position 2 the transmitter works into a series resonant circuit. The antenna is "current fed". The antenna circuit is resonated by means of controls M and O. Resonance is indicated by a maximum reading on the ANT CURRENT meter. The circuit is used generally for operation near the fundamental frequency of an antenna and therefore is not particularly efficient for tuning the standard antennas, except as indicated in table II. When this tuning network is selected the value of capacity should be the maximum for which an inductance value can be found that will give resonance (this will be a minimum inductance value).

(4) With control N in position 3 the transmitter works into a series resonant circuit providing "current feed" and inductive loading. This circuit is used for operation below the fundamental frequency of the antenna and is generally used when tuning the standard antenna operating on the higher frequency assignments of this installation.

(*a*) The antenna circuit is resonated by means of the continuously variable inductor controlled by M.

(*b*) Resonance is indicated by the rise in the total plate current and the indication of current on the antenna circuit meter.

(*c*) Having found resonance, the transmitter is loaded by advancing control D until the proper plate current is indicated on the total plate current meter (200 to 220 ma. on c.w.). ***Caution:*** Always use the lowest numbered position of control D which will give the total plate current indicated in (*c*) above. Overcoupling results in detuning the power amplifier circuits, loss of r. f. current in the antenna, indistinct transmissions, and wide side bands.

(5) With the control N on position 4 the antenna circuit is identical with that obtained on position 3 except that an additional inductor controlled by P is added in series with the variable inductor 1167. This circuit is used when the operating frequency is relatively far below the fundamental frequency of the antenna, as will be the case when these installations and the standard antenna are operated on frequency assignments of 1,500 kc. and somewhat above. The adjustment of this circuit is accomplished as follows:

(*a*) Set the control D on 1.

(*b*) Set the control P on 1.

(*c*) The inductor control M is rotated through its limits, watching closely the total plate current meter for any indication of resonance

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:20 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(sharp rise). If resonance is found the transmitter is loaded to its proper value.

(*d*) If resonance is not found at this setting of P, successively advance P to higher values and repeat the variation of control M for each position of P until resonance is found.

(6) The antenna tuning unit BC-306-A is external to the antenna tuning equipment located on the transmitter. It is applied in the tuning of the crowfoot antenna, and is in general not used with the inverted L-antenna (removed or control E set on position 1). By means of the ANTENNA VARIOMETER SWITCH E large steps of inductance are added to the antenna circuit. By means of the ANTENNA VARIOMETER F continuously variable amounts of inductance may be added to the antenna circuit. This unit is used in conjunction with positions 3 and 4 of the control N and in a manner very similar to that in (5) above, except that the unit covers adjustments of the crowfoot antenna in the frequency range 400 to 800 kc., inclusive, and that controls F and E are used instead of controls M and P (see table I). Controls M and P may also be used in conjunction with the antenna tuning unit BC-306-A for fine adjustments.

(7) The change in antenna circuit constants as a result of tuning reflects into the tank circuit of the power amplifier. This necessitates a retuning of the power amplifier. The tuning of an antenna is not complete until the power amplifier and antenna circuits are both resonated to the transmitter frequency. Always secure resonance with minimum inductance, if a choice is present.

d. Modulator bias adjustment.—Having completed the procedure directed in *b* above—

Caution: Allow the power unit PE-49-C to come to stable operating point (for warm-up and voltage adjustment, see par. 22*b* (1) and (2)) before the following adjustment is made.

(1) Note the value of total plate current when the transmitter is tuned for c. w. operation.

(2) Move the transmitter OFF ON switch to the OFF position.

(3) Place the TONE CW VOICE switch on the VOICE position.

(4) Move the transmitter OFF ON switch to the ON position.

(5) Press the TEST KEY located to the left center of the transmitter panel, and note the current indicated on the TOTAL PL CURRENT meter. The total plate current meter should now read a current 20 ma. greater than the current noted in (1) above, as the modulator tubes are now drawing about 20 ma. (One small scale division of the TOTAL PL CURRENT meter is equivalent to a

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:25 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

20 ma. current change.) In event that the current change is greater or less than 20 ma., the control labeled MOD BIAS will need adjustment. (The dial on this control is so calibrated that the current drawn by the modulator tubes is inversely proportional to the setting of the dial.) The dial is rotated by using a screw driver inserted in the dial rotating device located just to the left of the MOD BIAS control (fig. 4). Proceed with the adjustment as follows:

(6) Release the TEST KEY.

(7) Move the transmitter OFF ON switch to the OFF position.

(8) Remove the tube compartment shield.

(9) By successive small steps and the procedure indicated in (1) to (7), inclusive above, rotate the MOD BIAS control in a direction so as to bring the modulator plate current to the value indicated in (5) above.

e. For voice operation.—Having completed the adjustment of the MOD BIAS control, the adjustment of the INPUT LEVEL control is next in order. This adjustment will require the use of an additional radio set suitable to send and receive transmissions in the frequency range of the radio set SCR-177-B. This additional radio set should be located at a sufficient distance or operated with a reduced receiving antenna such that the receiver circuits are not overloaded by the signal strength of the transmissions from the SCR-177-B. The adjustment is accomplished as follows:

(1) Release the TEST KEY.

(2) Set the transmitter BC-191-C OFF ON switch in the OFF position.

(3) Insert the plug for the microphone in the MICRO jack of one of the receivers in chest CH-49.

(4) Set the SEND REC switch located on the receiver panel to the SEND position.

(5) Set the OFF MVC AVC switch located on the receiver panel in the MVC position.

(6) Remove the tube compartment shield and, using a screw driver inserted in the dial rotating device located to the left of the INPUT LEVEL control (fig. 4), set the dial at 1.

(7) Set the transmitter OFF ON switch in the ON position.

(8) Depress the microphone button and, using a standard speech input to the microphone, conduct a transmission to the distant radio station mentioned above. (These transmissions should be of about 30 to 45 seconds duration in order that the distant operator may judge the quality of the speech transmission.) The standard speech input

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:25 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

is obtained by holding the microphone about 2 inches from the lips and speaking in a normal conversational tone.

(9) Obtain a report as to signal strength and degree of modulation.

(10) By successive small steps rotate the INPUT LEVEL control to higher numbered positions, by the procedure directed in (6) to (9), inclusive above, until the distant station makes a report of indistinct transmission.

(11) Reduce the setting of the INPUT LEVEL control somewhat and obtain a report from the distant station. The transmissions should now be clear and distinct.

(12) Note the value of total plate current during the transmission conducted in (11) above. This should never exceed 300 ma. Under very noisy conditions it will be necessary to set the INPUT LEVEL control at a much lower point than that arrived at in (11) above and raise the speech level to the microphone until the current noted above is obtained. The speech level to the microphone is raised by talking in a loud voice with the microphone touching the lips. Setting the INPUT LEVEL control too high results in overmodulation with indistinct transmissions, abnormally wide side bands with the consequent increase in interference on adjacent channels, overloading of power sources, blowing of fuses, and damage to the equipment.

f. For tone operation.—(1) Having completed the procedure directed in *b* and *c* above—

(*a*) Move the transmitter OFF ON switch to the OFF position.

(*b*) Place the TONE CW VOICE switch on the TONE position.

(*c*) Move the transmitter OFF ON switch to the ON position.

(*d*) Tone modulation may be effected by using the microphone button, transmitting key, or TEST KEY. The total plate current reading will be between 300 to 350 ma.

(2) It may be necessary to readjust the carburetor of power unit PE-49-C as indicated in paragraph 22*b*(1)(*j*) in order that the power unit will operate correctly under the full load conditions of (*d*) above.

g. Side tone.—Side tone in the installation of radio set SCR-177-B is obtained from an energized receiver set at the frequency of transmission. The magnitude of the side tone is a function of the setting of the receiver controls and the use of the c. w. oscillator. The side tone feature, a part of the transmitter BC-191-C, is *not* used in this installation.

26. Receiving.—*a. General.*—The radio receivers BC-312-C and BC-314-C present a very similar mechanical appearance when viewed from the front of the panel. The radio receiver BC-314-C covers

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:25 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

its frequency range of from 150 to 1,500 kc., inclusive, by means of four integral coil band changes. The radio receiver BC–312–C covers its frequency range of from 1,500 to 18,000 kc., inclusive, by means of six integral coil band changes and in addition has an optional circuit known as crystal phasing, not a part of radio receiver BC–314–C.

b. Controls.—(1) On the receivers BC–312–C and BC–314–C or connected to it (see figs. 7 and 8) are the following controls:

(*a*) A multiple-position switch located on the left center of the front panel marked BAND CHANGE. Each position is marked with the limiting frequencies in kilocycles of the band through which the receiver can be tuned (see par. 33). The BAND CHANGE switch also operates a masking plate in front of the main tuning dial.

(*b*) A flat disk main tuning dial located in the upper left of the front panel behind a windowed reflector and marked FREQUENCY. On the radio receiver BC–312–C the dial has seven concentric scales, the outer six of which are calibrated directly in frequency. The first or inner scale is calibrated in equal division from 0 to 45 for ready position reference. The masking plate referred to in (*a*) above covers the frequency scales not in active use so that only the 0 to 45 scale and that pertaining to the frequency band selected by the BAND CHANGE switch may be read. The radio receiver BC–314–C is similar, with four frequency calibrated scales and one 0 to 45 scale.

(*c*) Two controls on the right center of the front panel marked FAST TUNING and VERNIER, respectively. The FAST TUNING control rotates the main tuning dial at a reduction ratio of 25 to 1. The VERNIER control rotates the main tuning dial at a reduction ratio of 90 to 1. A calibration of 100 equal divisions around the periphery of the VERNIER control permits interpolation of the inner 0 to 45 scale of the main tuning dial. The VERNIER control makes one complete revolution to move the main tuning dial one graduation on the 0 to 45 scale.

(*d*) An antenna tuning control to the left of the main tuning dial marked ALIGN INPUT.

(*e*) On BC–312–C *only*, a crystal filter control to the right of the main tuning dial marked CRYSTAL PHASING. An arrow on the control, when the latter is rotated to the OUT marking on the panel, indicates that the crystal filter is out of the receiver circuit. Other positions of the arrow indicate that the crystal filter is in the circuit.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:25 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*f*) A volume control to the right of the CRYSTAL PHASING control. It is marked VOL and has 100 equal divisions marked on its periphery for ready position reference. An arrow marking on the control indicates the direction of rotation for increasing volume. This control is effective for manually changing the volume when the OFF MVC AVC switch is in either the MVC or AVC position.

(*g*) A two-way toggle switch marked CW OSC OFF ON located to the right of the VOL control.

(*h*) A CW OSC ADJUST control located in the upper right-hand corner of the front panel.

(*i*) A three-position switch in the lower right of the front panel marked OFF MVC AVC, respectively, for each position. When the arrow on this switch points to OFF, power is removed from the receiver. When it points to MVC, the receiver is turned on and manual volume control of the receiver is provided. When it points to AVC, the receiver is turned on and automatic volume control of the receiver is provided. The OFF MVC AVC and VOL controls jointly function to control the output level.

(*j*) A two-way toggle switch in the lower right of the front panel marked SEND REC.

(*k*) On the BC-312-C two small knob controls located below the band change switch, marked NOISE ADJUST and NOISE BALANCE, respectively, which are not used in the operation of radio set SCR-177-B.

(*l*) Three fuse holders marked FUSE on their screw caps, and LAMPS, DYN-FIL, and SPARE on the panel immediately below. Being identical, the fuses contained within all three holders are interchangeable.

(*m*) In radio receiver BC-312-C three terminals are marked SIG ANT, NOISE ANT, and GND. For radio receiver BC-314-C, the terminal marked NOISE ANT is omitted. They are all located along the left side of the front panel.

(*n*) Five jacks marked KEY, MICRO, SPEAKER 2D AUDIO, PHONES 2D AUDIO, and PHONES 1ST AUDIO, respectively, located on the lower right edge of the front panel. These jacks are provided for the insertion of plugs for a key, microphone, loudspeaker, and headphones, respectively.

(*o*) A 14-contact socket located on the front panel. Power for the receiver is supplied through a cord plug which is inserted into this socket. The leads from this power socket to the interior of the receiver are accessible upon unscrewing four screws of a protective metal cover above the socket and removing the cover.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:25 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*p*) A ground wire for grounding the receiver chassis to the general ground at the receiving chest is connected to the GND terminal.

c. Procedure.—The receiver may be operated for c.w., tone, or voice reception. Volume level is controlled manually, or manually and automatically in all cases. For the radio receiver BC–312–C *only* selectivity may be controlled by the use of the crystal filter in all modes of operation.

(1) *For c.w. reception.*—(*a*) See *a* and *b* above.

(*b*) Insert plugs for headsets P–18 in PHONES 2D AUDIO jack, or PHONES 1ST AUDIO jack of the receiver.

(*c*) Rotate BAND CHANGE switch to the position which covers the assigned frequency.

(*d*) Move the CW OSC OFF ON switch to the ON position.

(*e*) Move the CRYSTAL PHASING control to the OUT position. BC–312–C *only.*

(*f*) Move the SEND REC switch to the REC position if the receiver is not used in conjunction with the transmitter.

(*g*) Rotate the FREQUENCY or main tuning dial by means of the FAST TUNING control until the assigned frequency is indicated on the dial.

(*h*) Move the OFF MVC AVC control switch to the MVC position. Receiver output volume is manually controlled when the switch is in this position.

(*i*) After a brief period of time in which the receiver "warms up", rotate the ALIGN INPUT control until maximum noise is heard in the headset.

(*j*) If the signal is weak or slightly off frequency, use the VERNIER control for finer tuning. C.w., tone, or voice signals on the assigned frequency should now be distinguished. It may be necessary to tune on either side of the assigned frequency until the desired signal is located and readjust the ALIGN INPUT control.

(*k*) The pitch of the signal may now be further adjusted to a desired note by the CW OSC ADJUST control. The use of the CW OSC ADJUST control permits a 4,000 cycle variation in the resultant beat note of the c.w. signal, but does not change the frequency adjustment or sensitivity of the receiver.

(*l*) The VOL control may be rotated at any stage of the tuning to adjust the output volume to a desired level. An increase in volume increases the sensitivity of the receiver. In tuning the receiver initially, it is preferable to maintain the volume fairly high.

(*m*) An increase in selectivity of the receiver BC–312–C if desired may now be accomplished as prescribed in (4) below. It is inadvis-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

able to employ automatic volume control when receiving c.w. or tone signals.

(2) *For tone or voice reception.*—Use the same procedure as prescribed for c.w. reception ((1) above) except place the CW OSC OFF ON switch in the OFF position as soon as the signal is tuned in.

(3) *For automatic volume control.*—Move the OFF MVC AVC switch to the AVC position. While this reduces the sensitivity of the receiver, it tends to maintain the output at a constant level as determined by the VOL control setting. Automatic volume control is preferable where the voice signal fluctuates or otherwise tends to vary in output level.

(4) *For increased selectivity or rejection of interfering signal.*—In radio receiver BC-312-C the rotation of the CRYSTAL PHASING control from the OUT position in a counterclockwise direction increases the selectivity of the receiver. Careful adjustment of this control will permit of rejecting or minimizing an interfering signal on an adjacent channel without serious attenuation of the desired signal. Maximum selectivity is, in general, indicated by minimum background noise and usually is established when the arrow on the CRYSTAL PHASING control is in nearly the vertical position. The crystal filter is intended primarily for use in the reception of c.w. signals. It distorts voice signals, but where a heavy background noise exists it may improve the over-all intelligibility. Its best use must be determined by trial.

27. Removal from service.—*a. General.*—Note any operating difficulties, failure of functions, broken or damaged parts, and make the inspections noted in paragraph 28. See that provision is made to inform the repair personnel of the using organization of needed maintenance.

b. Procedure.—Proceed to remove the radio set from service as follows:

(1) Set all switches to the OFF position.

(2) Set the field switch on the power unit to the OPEN position.

(3) Stop the gasoline motor on power unit PE-49-C. This may be accomplished by pressing on the ignition starting button located on the rear blower housing until the engine is stopped. Close the fuel supply valve.

(4) Disconnect all cording to chests.

(5) Disconnect antenna and counterpoise leads.

(6) Unstep the legs from the transmitting and receiving chests and store them in the bottom of chest CH-30.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(7) Dismantle the antenna in the reverse order to that of erection (see par. 21). ***Caution:*** Do not allow the masts to fall to the ground. In many cases the impact will damage the mast sections.

(8) Load the reels with the guys and antenna components in the reverse order to "paying out" (see par. 21*c*).

(9) Having assembled the items to be stored for transport in front of each chest, check the items on hand against the *chest lists*. Locate any missing items.

(10) Pack the chests for transport.

(11) Remove the oil bath air filter from the air intake pipe and pour out the oil contained therein. Allow the unit to drain a few minutes before placing in the storage compartment.

(12) Replace and fasten the hood on power unit PE–49–C.

28. Care and maintenance.—*a. Inspections.*—To insure uninterrupted service, visually inspect the various components of each installation before and after each day's operation. Make a thorough inspection of each component after every 50 hours of operation. Detailed inspection instructions are contained in paragraph 36.

b. Care.—(1) While the components of this equipment are provided with shock mountings, handling of the intricate components should be done in such a manner as to prevent undue mechanical shocks or stresses.

(2) Moisture is probably the most common source of trouble in the operation of field radio sets. All possible care should be exercised to protect the equipment from direct rain and conditions of unusually high humidity.

(3) At all times when not in use, the components should be made secure in their respective chests and covers.

(4) *Battery BB–46.*—The care of battery BB–46 should include frequent inspection of the specific gravity and level of the electrolyte. If necessary add distilled water and charge. Keep the outside of the battery clean and dry. For additional information on the care of storage batteries see TM 11–430 (now published as TR 1190–5).

c. Lubrication.—The components of this radio set will be lubricated as outlined in paragraph 38.

d. Special adjustments.—See paragraphs 36, 38, 39, 40, and 41.

e. Make the necessary repairs as authorized in paragraph 44.

29. Storage.—If this radio set is to be removed from service for several days, proceed as directed in paragraphs 27*a*, *b*, and 44.

Caution: Storage batteries not in service require regular maintenance.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

30. Transportation.—The transportation of radio set SCR-177-B to and from field installations will be provided for by using organizations.

SECTION III

DETAILED FUNCTIONING OF PARTS

31. General.—*a.* The functional usage of the numbered circuit elements which are a part of the general circuits of the components of this radio set are described in tabular form in paragraphs 46, 47, and 48.

b. References.—Publications containing fundamental information relative to the performance of individual elements comprising this radio set are—

Electrical fundamentals, TM 1-455.
Radio fundamentals, TM 11-455.
Fuels and carburetion, TM 10-550.
Automotive electricity, TM 10-580.

32. Radio transmitter BC-191-C and transmitter tuning units TU-3-A, TU-5-A, and TU-6-A.—*a. General.*—Radio transmitter BC-191-C in conjunction with one of the transmitter tuning units, provides for the excitation of an antenna at radio frequency. When the keying circuit of the transmitter is closed, the antenna switching relay performs the operations necessary to cause the adjusted transmitter to generate the radio frequency power necessary for a transmission. A selector switch marked TONE CW VOICE, performs the circuit modification required in order that the transmitted signal may be either tone-modulated, c.w., or voice-modulated. Suitable controls located on the transmitter tuning units and radio transmitter provide for the selection and adjustment of the transmitter at frequencies within the range of the transmitter and transmitter tuning units as follows:

(1) 400 to 800 kc., inclusive, TU-3-A.
(2) 1,500 to 3,000 kc., inclusive, TU-5-A.
(3) 3,000 to 4,500 kc., inclusive, TU-6-A.

b. Minor circuits.—The functional circuits of the radio transmitter BC-191-C in conjunction with a transmitter tuning unit are as follows:

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(1) *Master oscillator.*—The master oscillator circuit is associated with the vacuum tube VT–4–C, marked MO and reference No. 1101

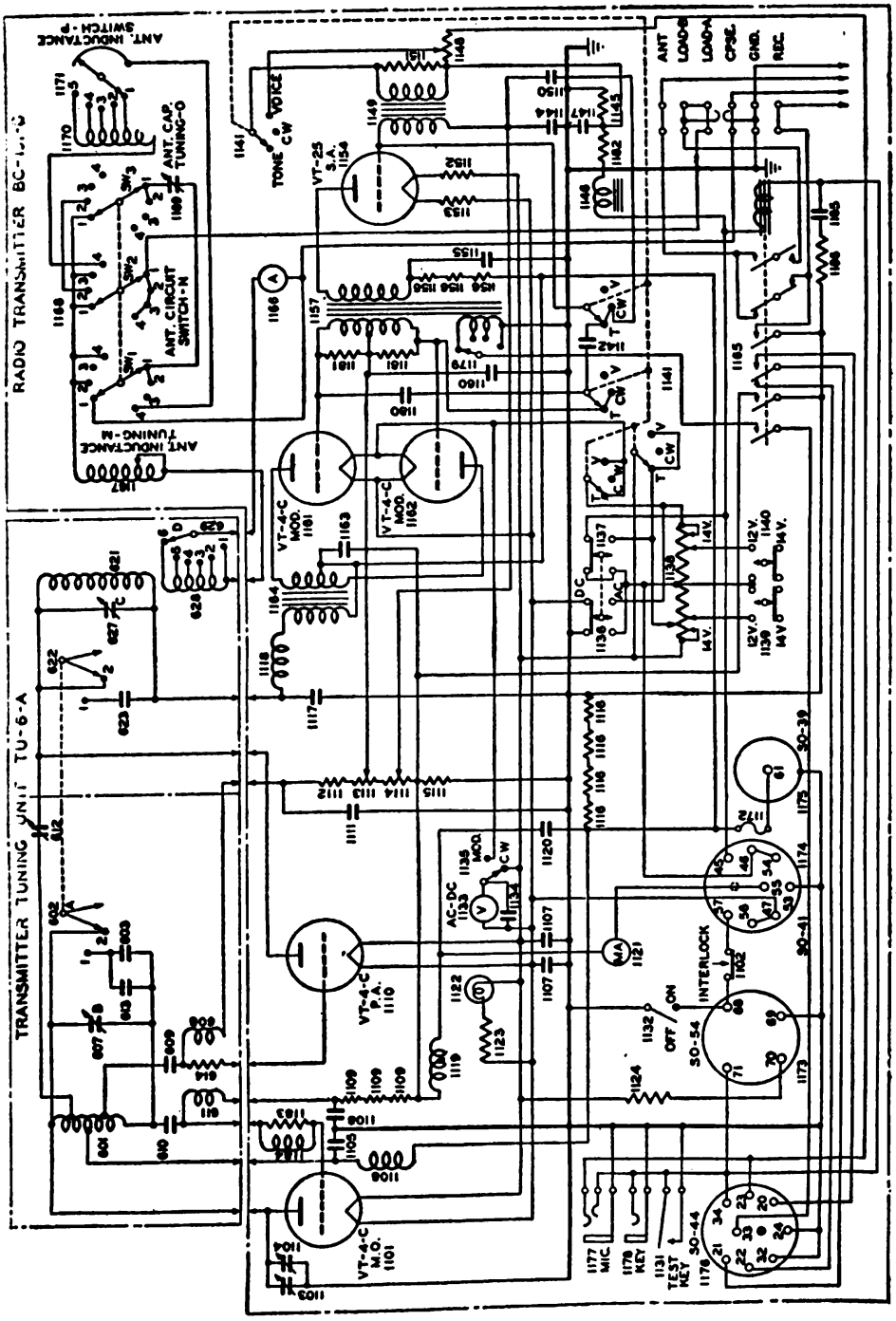


FIGURE 23.—Radio transmitter BC–191–C with transmitter tuning unit TU–6–A (schematic diagram).

(see fig. 23). This vacuum tube and associated circuit provide a source of radio frequency voltage for the excitation of the power amplifier at a controllable frequency. The frequency is *nearly*

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

independent of the ambient temperature and antenna tuning and loading operations.

(2) *Power amplifier.*—The power amplifier circuit is associated with a VT-4-C vacuum tube marked P. A. and reference No. 1110 (see fig. 23). This vacuum tube and associated circuits provide for the conversion of d-c power to radio frequency power. The frequency of conversion is set by the master oscillator circuit. Power to the circuit may be modulated at audible frequencies. Radio-frequency power is derived from the tank circuit coupling to the antenna coupling coil.

(3) *Modulation circuit.*—The modulation circuits are associated with two vacuum tubes VT-4-C marked MOD, 1161, and MOD, 1162 (see fig. 23). This circuit is of the push-pull transformer coupled class B type and receives its excitation from the speech amplifier stage. Its purpose is to modulate the voltage and thus the power delivered to the power amplifier circuit.

(4) *Speech amplifier circuit.*—The speech amplifier circuit is associated with a vacuum tube VT-25, marked S. A. and 1154 (see fig. 23). The purpose of the speech amplifier stage is to furnish excitation for the modulator tubes. The stage receives its excitation as follows:

(*a*) *Regenerative.*—When the TONE CW VOICE switch is set on TONE, capacitors are connected across the grid and plate circuits and between the grid and plate circuits to form a self-oscillatory circuit (see fig. 23). The frequency of oscillation is approximately 1,000 c. p. s.

(*b*) *Amplifier.*—When the TONE CW VOICE switch is set on VOICE the capacitors mentioned in (*a*) above are reconnected in a nonregenerative manner. The grid circuit of the speech amplifier may receive voice frequency voltages introduced through the speech input circuits of the transmitter. The speech amplifier then functions as a class A amplifier.

(*c*) The circuits under (*a*) and (*b*) above operate at all positions of the TONE CW VOICE switch to furnish a side tone feature of the transmitter not used in the installation of the radio set SCR-177-B.

(5) *Bias voltages.*—The bias voltages for the master oscillator and power amplifier circuits are obtained by separate fixed grid leak systems. The bias voltages for the modulator and speech amplifier circuits are obtained from separate adjustable taps on the power amplifier grid resistor.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(6) (*a*) *Filament voltages.*—The presence of filament voltage at the transmitter is controlled by the OFF ON switch.

(*b*) The TONE CW VOICE switch selects combinations of filaments to be lighted (modulator filaments are lighted on TONE and VOICE operation only) and introduces compensations for the different filament current loads on the generating equipment.

(*c*) Compensation for line voltage and mode of operations is effected through adjustments made on the filament resistor connection board and circuits thereof, and is controlled by the 12v–14.2v switch and TONE CW VOICE switch.

(7) *Keying.*—The keying of the transmitter is accomplished by auxiliary contacts of the antenna switching relay operating upon a resistor in the negative high voltage return of the entire transmitter circuit. The relay may be actuated by various key jacks.

(8) *Modes of operation.*—The transmitter may be operated on tone, c.w., or voice by the setting of the TONE CW VOICE switch on the transmitter.

(9) *OFF ON switch.*—The OFF ON switch controls the application of high and low voltage to the respective circuits of the transmitter through the action of a switching relay of the power unit PE–49–C, a component of the radio set SCR–177–B (see fig. 19).

(10) *Antenna tuning equipment.*—The antenna tuning equipment incorporated in the radio transmitter BC–191–C is designed to "current feed" or "voltage feed" a wide variety of antennas having either a net capacitive or inductive reactance.

c. Remote operation.—The transmitter is equipped with sockets and jacks such that it may be readily corded for remote keying on any one of the three modes of operation.

d. Power.—The power requirements of the radio transmitter BC–191–C, as a component of the radio set SCR–177–B, are supplied by the power unit PE–49–C through suitable cords (see fig. 21).

e. Transmitter tuning units TU–3–A, TU–5–A, and TU–6–A.—(1) Each transmitter tuning unit is calibrated with the radio transmitter which bears the same serial number. The calibration data for each tuning unit are contained in the calibration chart attached to the tuning unit.

(2) Transmitter tuning unit TU–3–A is so constructed (see fig. 24) that frequency changes are effected by means of variable inductors, controls B and C, and fixed capacitance changes effected by the control A.

(3) Transmitter tuning units TU–5–A and TU–6–A are so constructed that frequency changes are effected by variable capacitors,

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

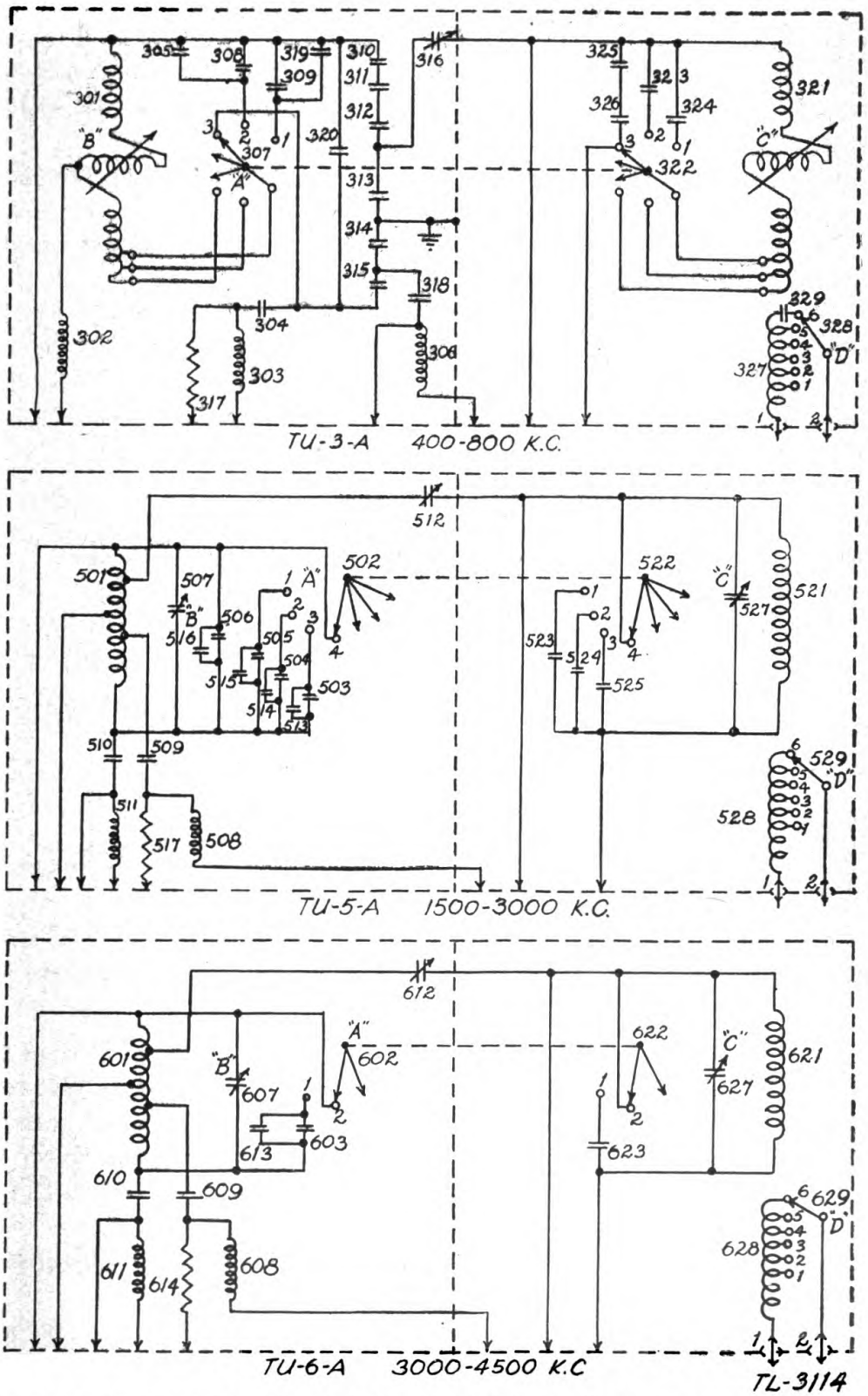


FIGURE 24.—Transmitter tuning units TU–3–A, TU–5–A, and TU–6–A (schematic diagram).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

controls B and C, and fixed capacitance changes effected by means of control A.

f. Functional diagrams.—The following functional diagrams will aid in a fuller understanding of the radio transmitter BC-191-C and associated circuits.

(1) The radio frequency and high voltage circuits when transmitter tuning unit TU-6-A is used (see fig. 25).

(2) The functional diagram of audio frequency circuits set for tone operation (see fig. 26).

(3) The functional diagram of audio frequency circuits set for voice operation (see fig. 27).

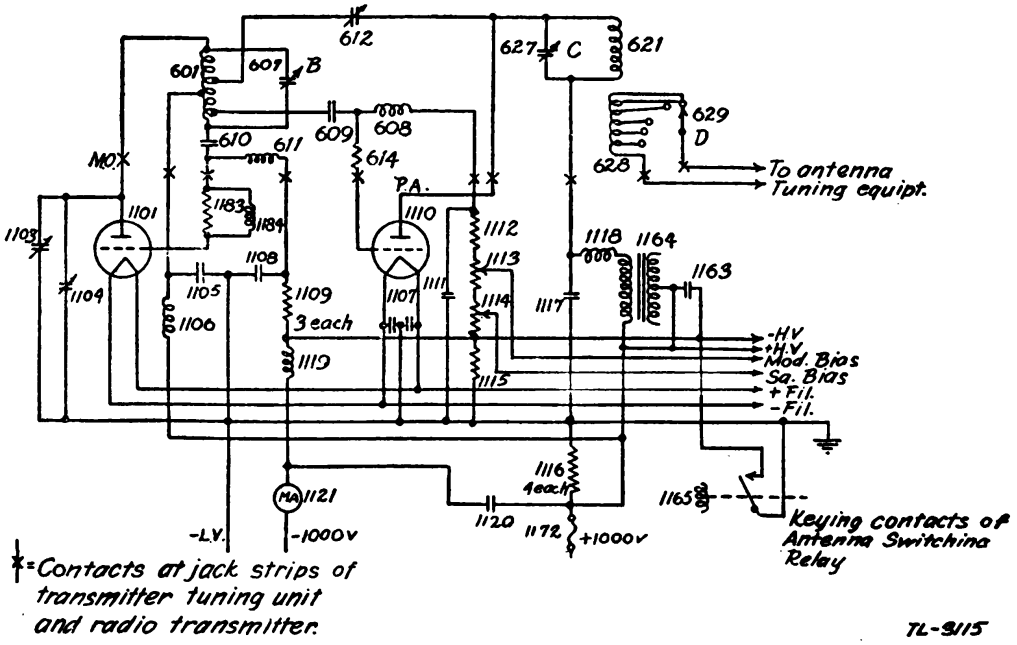


FIGURE 25.—Radio transmitter BC-191-C, functional diagram, radio frequency and high voltage circuits.

(4) Functional diagram of the audio frequency circuits when the transmitter is set for c. w. operation (see fig. 28). The side-tone circuits of radio transmitter BC-191-C are utilized in some installations of the radio transmitter in radio sets other than radio set SCR-177-B. The circuit is operative in radio set SCR-177-B, but is not corded to any phone or speaker jack of the installation.

(5) Antenna tuning unit BC-306-A is a variometer adjustable in steps as well as continuously (see fig. 29).

33. Radio receivers BC-314-C and BC-312-C (figs. 30 and 31).—*a. General.*—(1) *Frequency range.*—The combined frequency range of the radio receivers BC-314-C and BC-312-C extends from

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

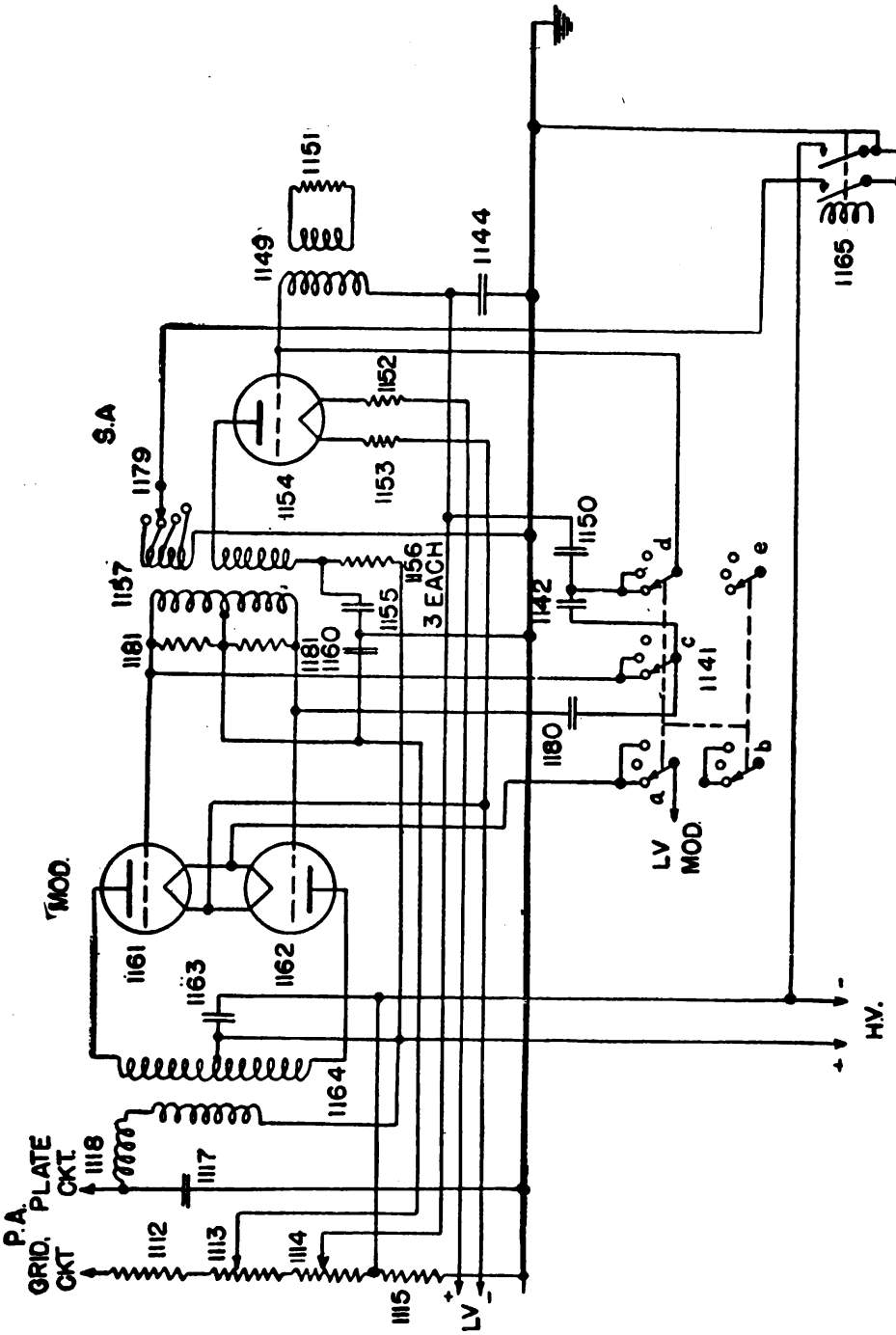


FIGURE 26.—Radio transmitter BC-191-C, functional diagram audio frequency circuits, tone operation.
NOTE.—The side-tone function is not used in radio set SCR-177-B.

Generated on 2015-09-24 19:26 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

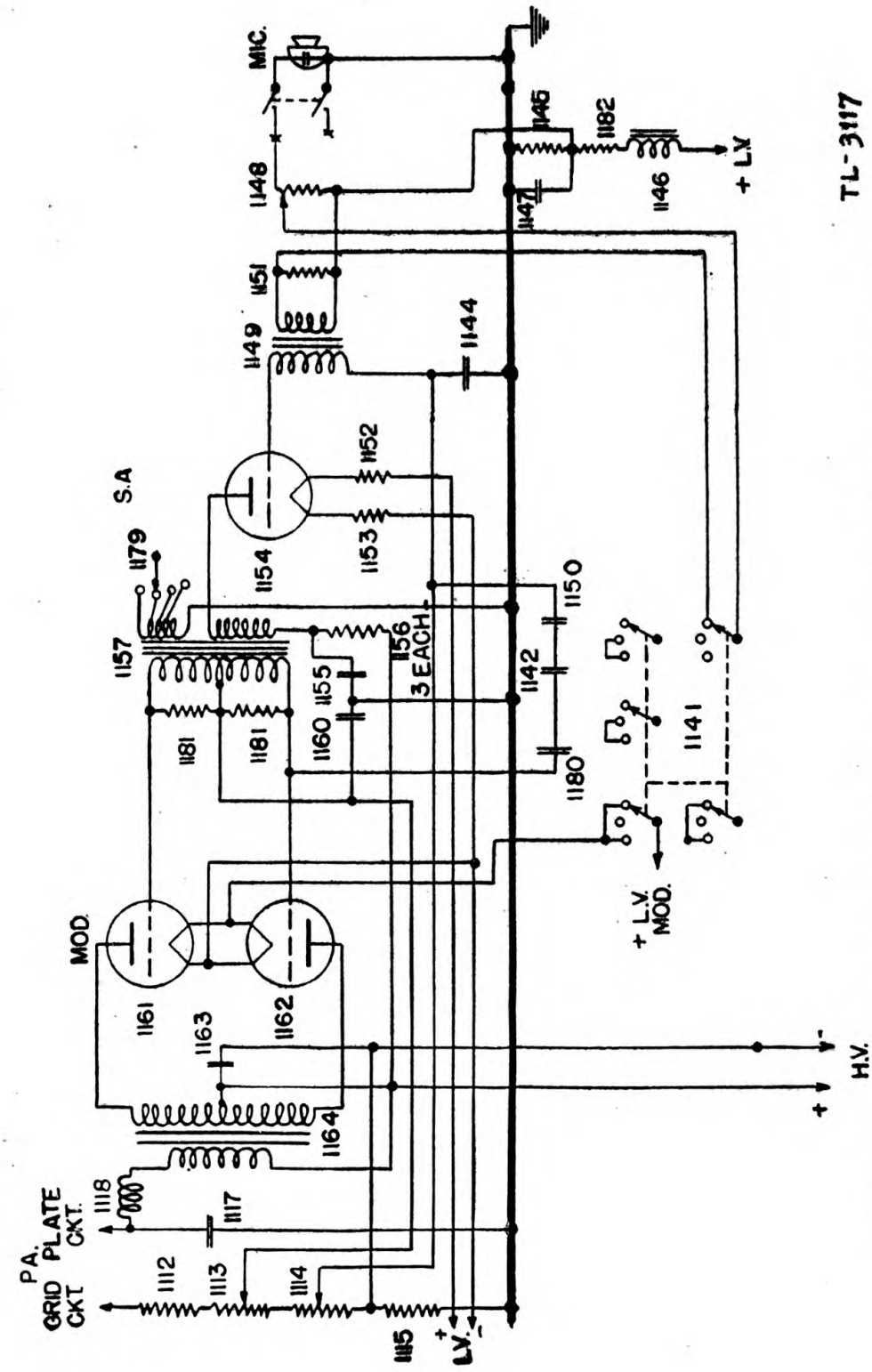


FIGURE 27.—Radio transmitter BC-191-C, functional diagram, audio frequency circuits, voice operation.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:27 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

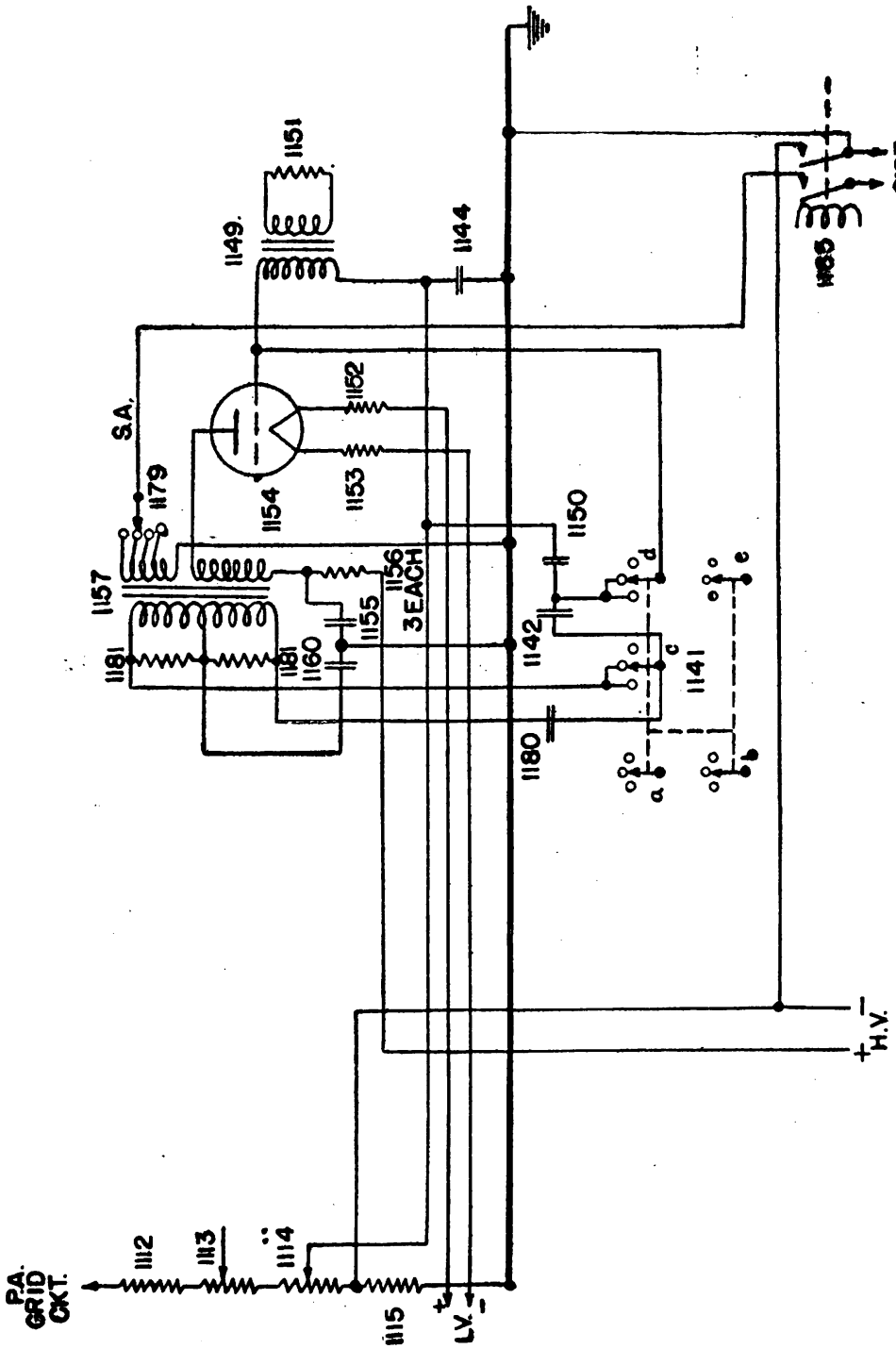


FIGURE 28.—Radio transmitter BC-191-C, functional diagram, audio frequency circuits, c. w. operation.

NOTE.—The side-tone function is not used in radio set SCR-177-B.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:34 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

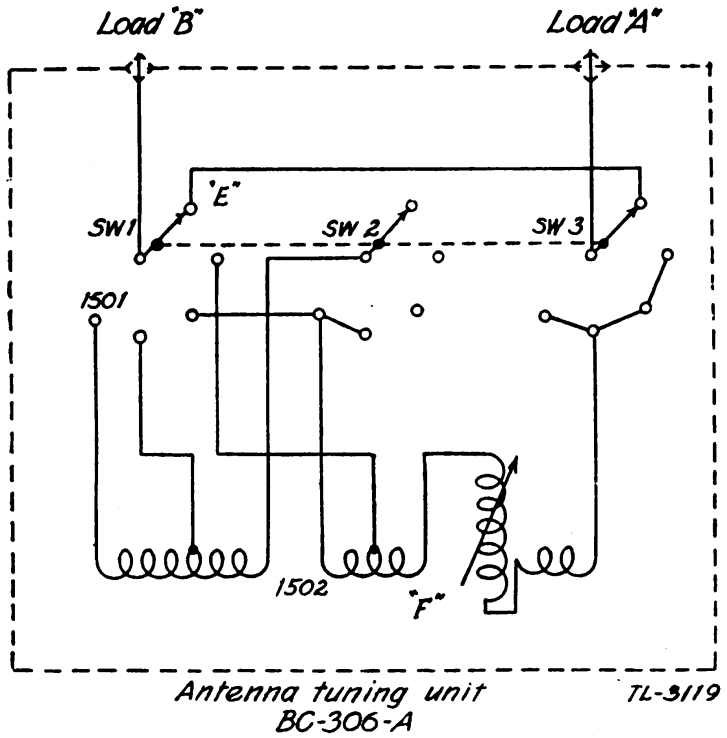


FIGURE 29.—Antenna tuning unit BC–306–A (schematic diagram).

150 to 18,000 kc., inclusive, and is divided into frequency bands on the respective receivers as follows:

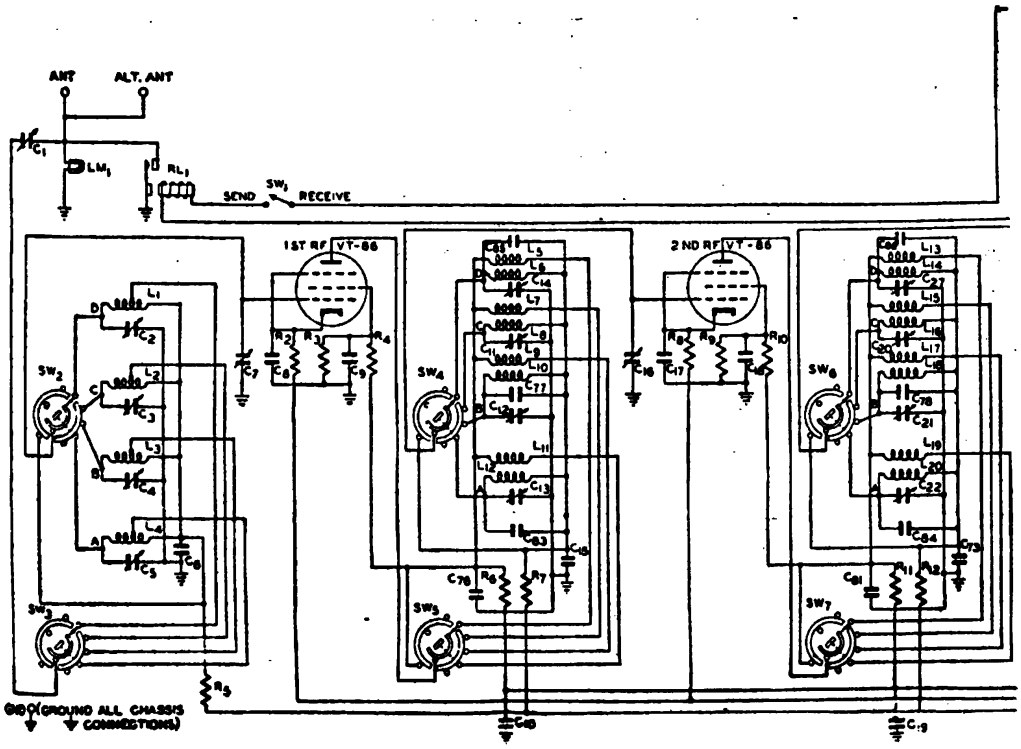
(*a*) *BC–314–C.*

Band	Frequency coverage, kc. (inclusive)
A	150 to 260.
B	260 to 450.
C	450 to 820.
D	820 to 1,500.

(*b*) *BC–312–C.*

Band	Frequency coverage, kc. (inclusive)
A	1,500 to 3,000.
B	3,000 to 5,000.
C	5,000 to 8,000.
D	8,000 to 11,000.
E	11,000 to 14,000.
F	14,000 to 18,000.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:34 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google



TL-3120

FIGURE 30.—Radio receiver BC-314-C (schematic diagram).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:34 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

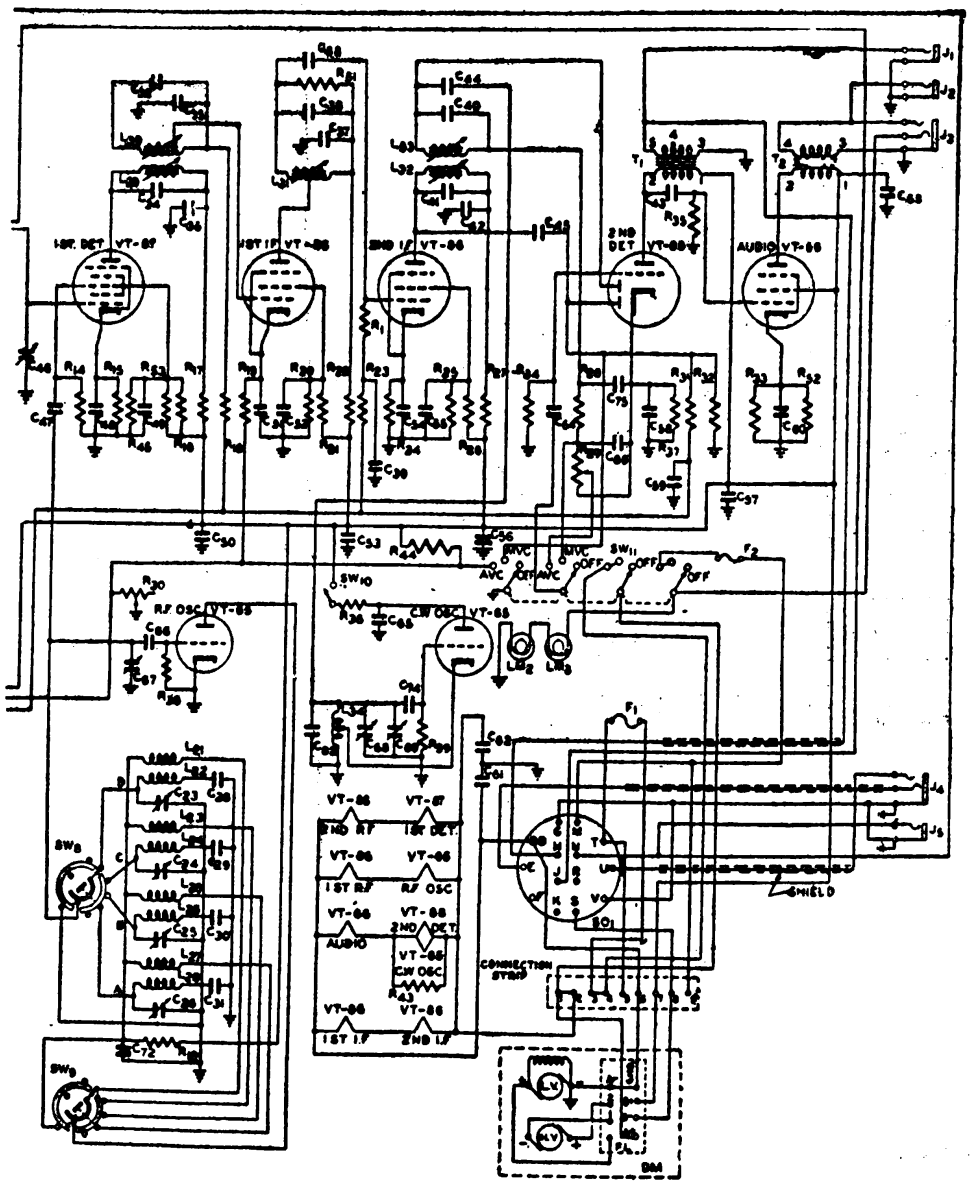


FIGURE 30.—Radio receiver BC-314-C (schematic diagram)—Continued.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

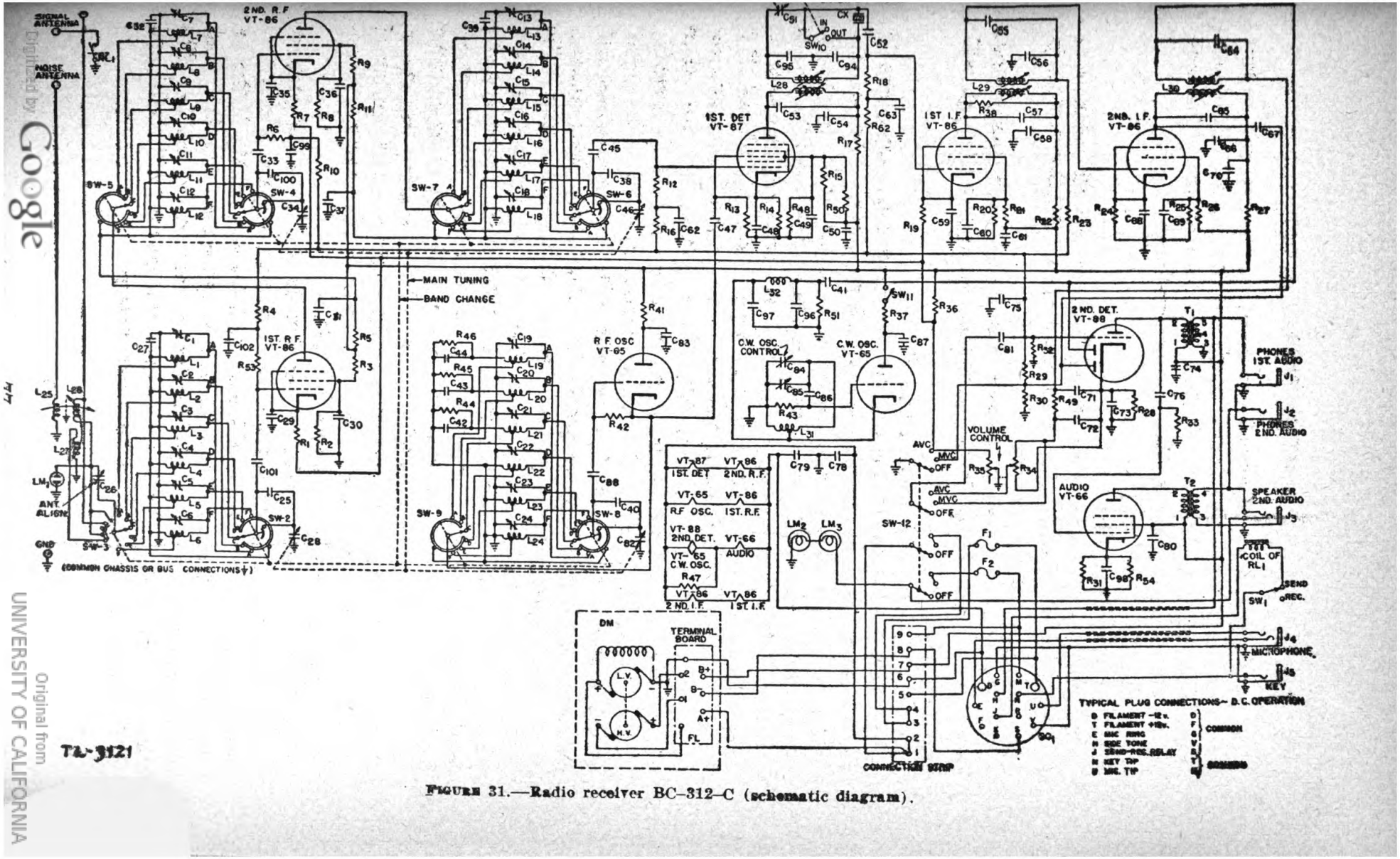


FIGURE 31.—Radio receiver BC–312–C (schematic diagram).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

(2) *Type of circuit.*—The receivers are of the integral coil, superheterodyne type intended for field and fixed station use. Provision is made for the reception of c. w., tone, and voice signals. The conversion frequencies (intermediate frequencies) are—

(*a*) BC–312–C, 470 kc.

(*b*) BC–314–C, 92.5 kc.

(3) *Power source.*—(*a*) One storage battery BB–46, common to both receivers in the installation of the radio set SCR–177–B, supplies power to the two receivers.

(*b*) The filament power is derived directly from the storage battery. A dynamotor DM–21–B in each receiver supplies the high voltage potentials.

b. Minor circuits.—See paragraph 31.

(1) *Antenna circuits.*—The external antennas, not components of the receivers, are connected to the ANT binding post. The external and internal antenna circuits serve to introduce radio frequency signals to the first radio frequency amplifier. The control marked ALIGN INPUT serves to adjust the antenna circuits to the particular frequency setting of the r. f. amplifiers. (See figs. 32 and 33.)

(2) *Noise adjust and noise balance.*—This circuit is on radio receiver BC–312–C *only* (see fig. 33). It is intended for use when the receiver is part of a vehicular set and is not used in the installation of radio set SCR–177–B, but may require an initial adjustment at the time of the first use of the receiver. The binding post marked NOISE ANT will have no external connections in this radio receiver.

(3) *Radio frequency amplifiers* (see figs. 32 and 35).—The radio frequency circuits associated with the band change switch and vacuum tube positions marked 1st and 2d RF serve to amplify the radio frequency signals introduced by the antenna. The action of the amplifier is frequency selective, and amplifies only those antenna signals for which the amplifier is set. The frequency setting is accomplished by band changes of pretuned circuits and the action of ganged variable capacitors. The r. f. output of the circuit is introduced into the mixer circuit described below.

(4) *Radio frequency oscillator* (see figs. 32 and 33).—The purpose of the circuit of the r. f. oscillator is to generate a signal which will always be a certain number of kilocycles different (usually higher in frequency than that for which the r. f. amplifiers are tuned). This is accomplished in a manner similar to that in (3) above. The circuit is associated with the vacuum tube marked RF OSC and VT–65, and is coupled to the 1st detector stage.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

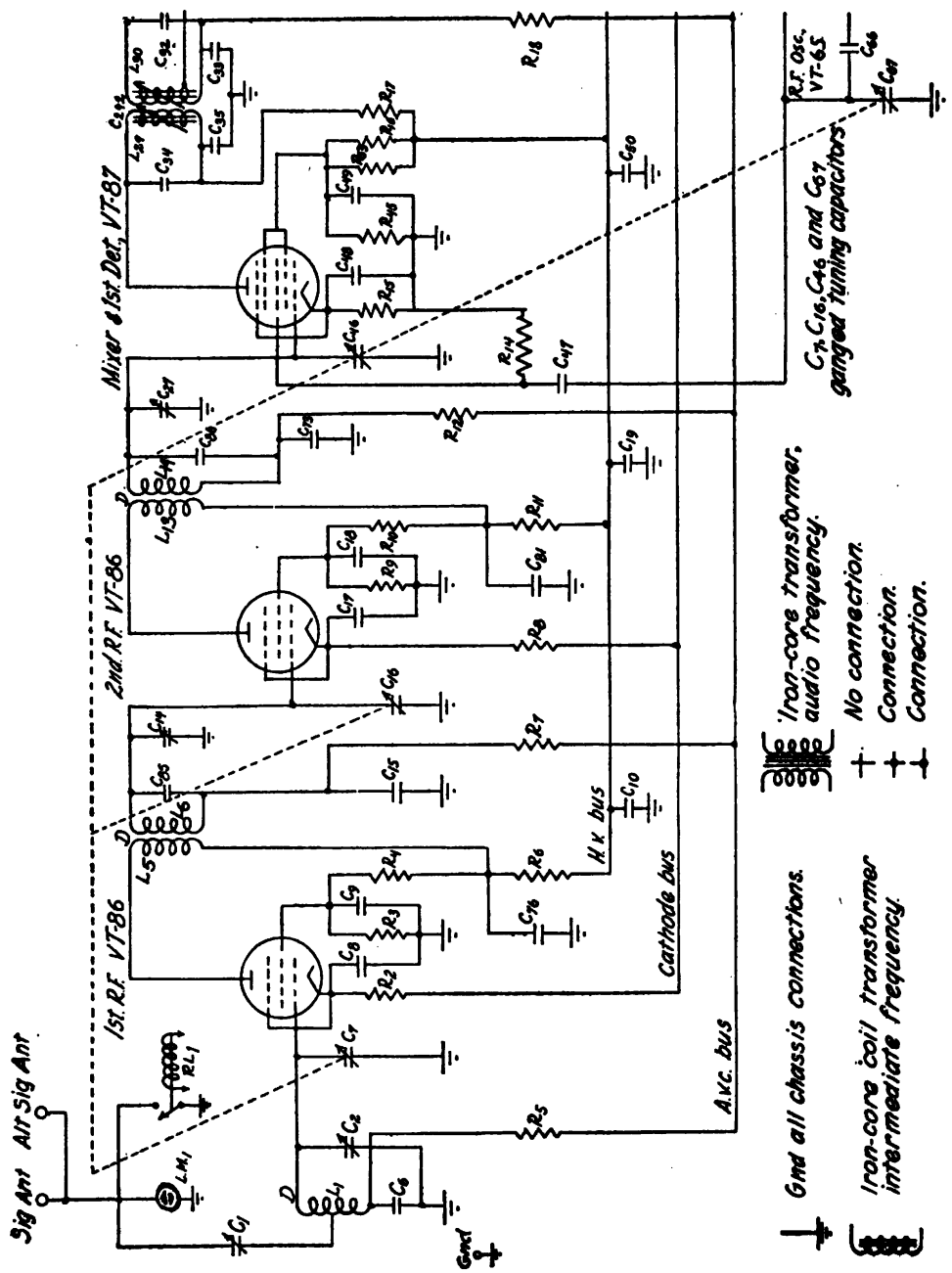


FIGURE 32.—Radio receiver BC-314-C, functional diagram, band D.

Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

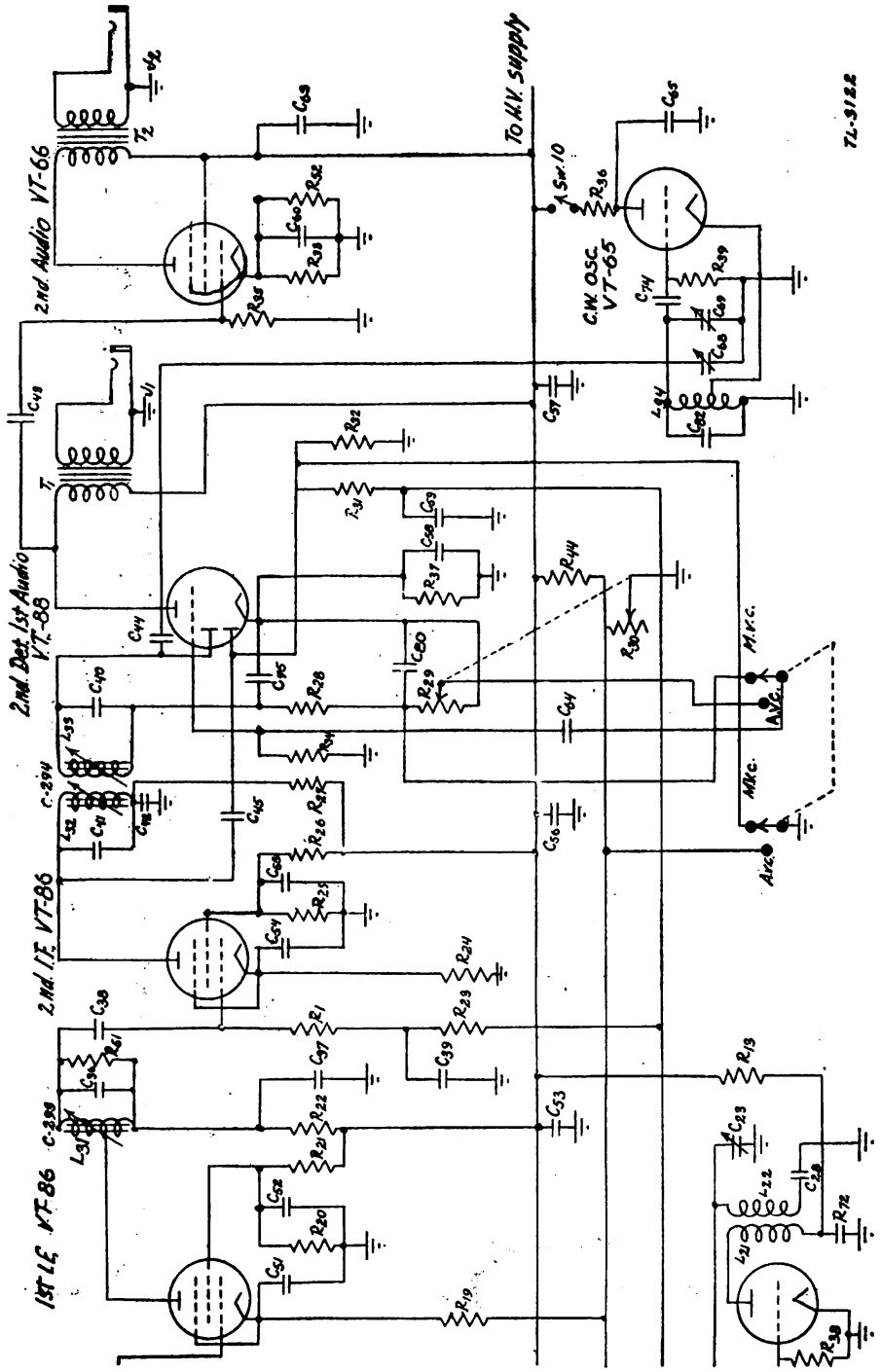


FIGURE 32.—Radio receiver BC–314–C, functional diagram, band D—Continued.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

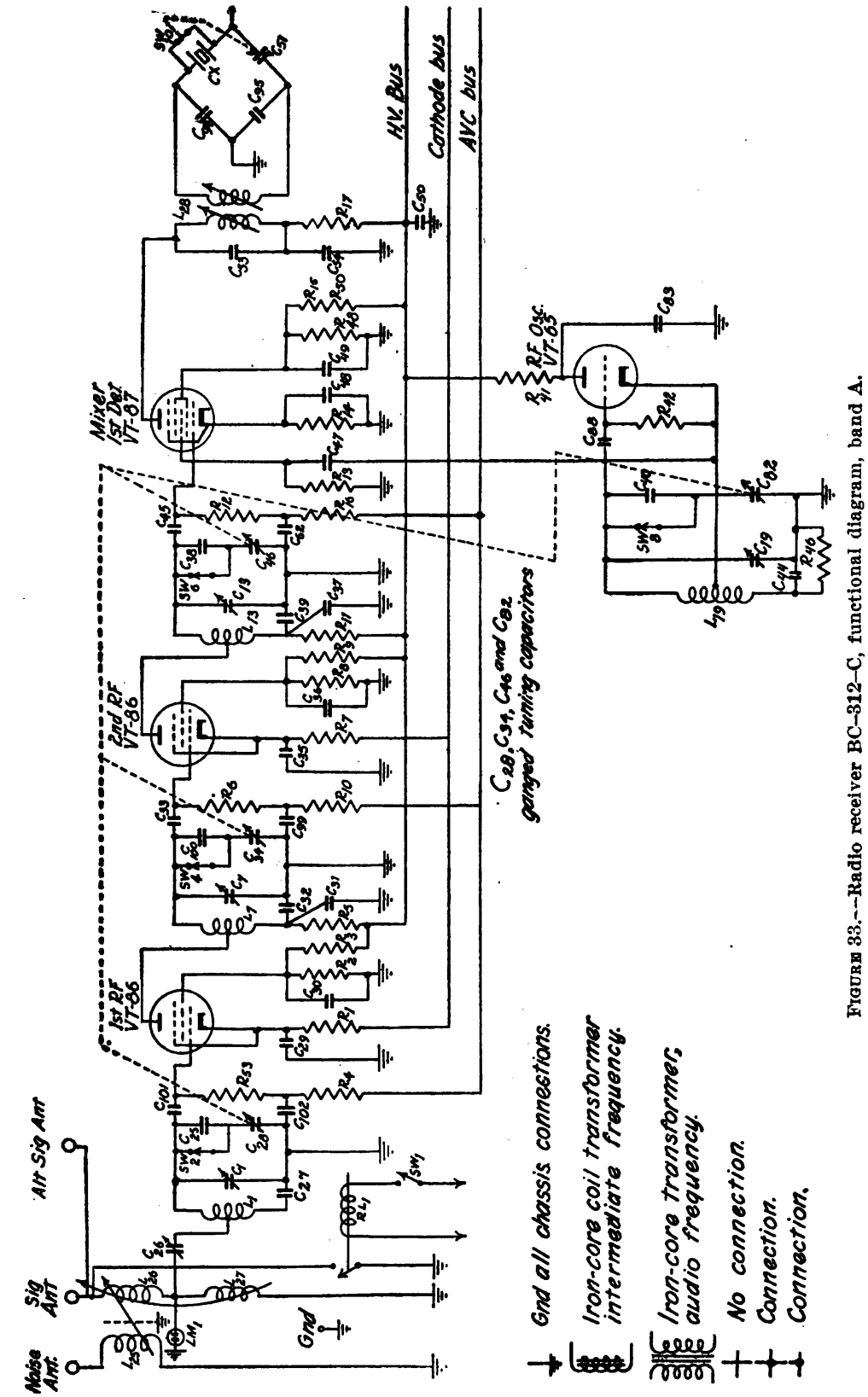


FIGURE 33.—Radio receiver BC-312-C, functional diagram, band A.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

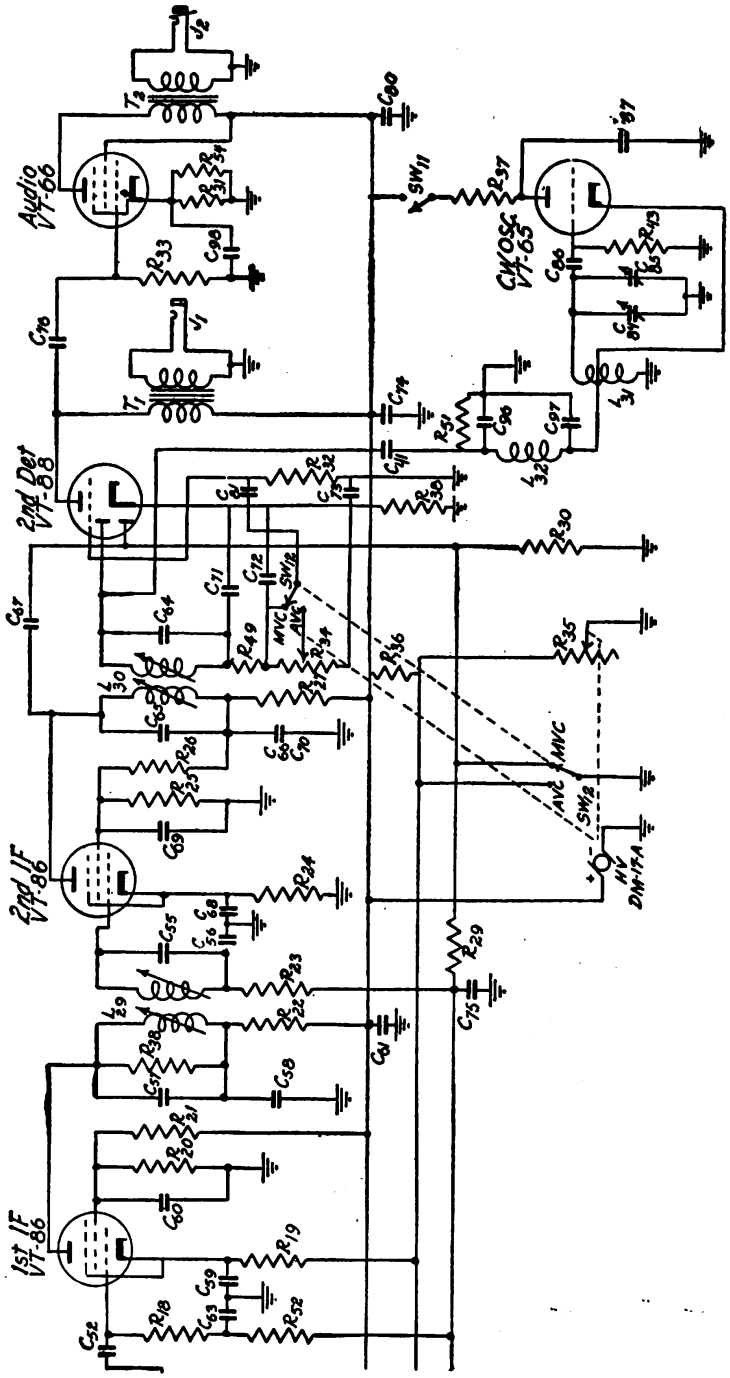


FIGURE 33.—Radio receiver BC–312–C, functional diagram, band A—Continued.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

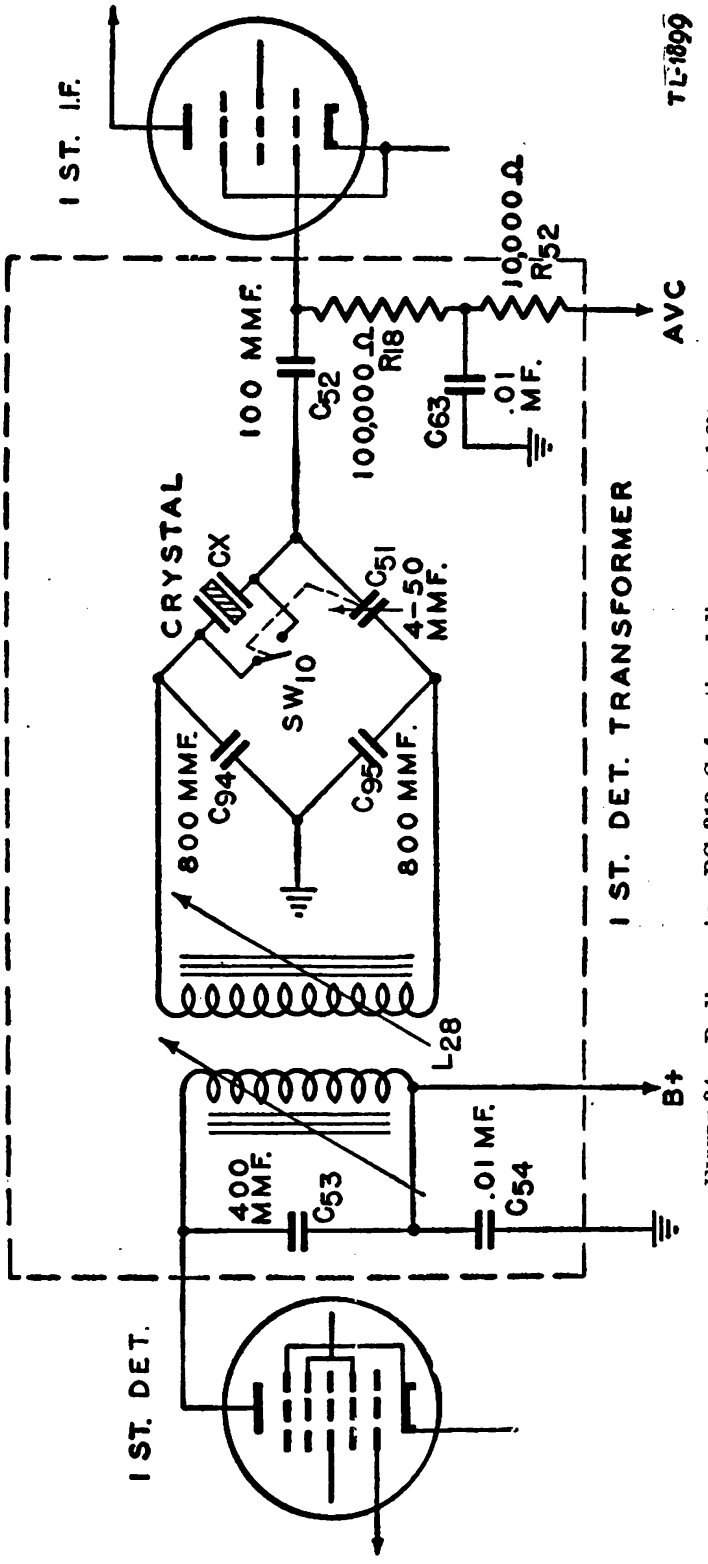


FIGURE 34.—Radio receiver BC-312-C, functional diagram, crystal filter.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(5) *First detector.*—The circuits of the 1st detector are associated with the vacuum tube marked 1st DET or VT–87 (see figs. 32 and 33). The purpose of this stage is to heterodyne the signals received from the 2d r. f. amplifier and r. f. oscillator. The resultant beat frequency is the intermediate frequency (conversion frequency) as noted in *a*(2) above, and is introduced into the intermediate frequency networks by the plate circuit of the first detector.

(6) *Intermediate frequency amplifiers.*—The intermediate frequency amplifiers are associated with the vacuum tubes marked 1st IF, 2d IF (figs. 32 and 33), and the circuits consist of pretuned (fixed frequency) amplifiers, each set to the proper conversion frequency (see *a*(2) above). The purpose of the stages is to amplify the i. f. signal generated in the 1st detector stage and the output voltages are introduced into the 2d detector circuit and a. v. c. circuit.

(7) *Crystal phasing* (figs. 33 and 34).—In the first intermediate frequency stage of the radio receiver BC–312–C *only*, there is introduced a bridge network which includes a quartz crystal CX cut so as to be resonant at the i. f. frequency. The purpose of this circuit is as follows:

(*a*) When it is desired to operate the receiver with the standard selectivity, the switch SW_{10} is closed by turning the control marked CRYSTAL PHASING to the OUT position, at which time the i. f. amplifier operates in a normal manner without any effect introduced by the crystal CX.

(*b*) The CRYSTAL PHASING control may be turned from the OUT position to *another* of many positions to insert the quartz crystal CX in the i. f. circuit and to balance a bridge circuit. This bridge circuit when at an optimum balance permits only such i. f. voltages as excite the crystal to be impressed on the grid of the first i. f. tube. The resonance curve of the quartz crystal is so sharp that the greater proportion of interfering signals and noise is rejected. The result is a very marked increase in the signal to noise ratio. Voice signals usually will suffer in intelligibility compared to the signal without the use of the crystal, and there usually will be considerable reduction in over-all receiver sensitivity.

(8) *Second detector* (figs. 35 and 36).—The circuits associated with the vacuum tube marked 2d DET and VT–88 perform the following functions:

(*a*) Detection (demodulation).

(*b*) Automatic volume control action (optional use).

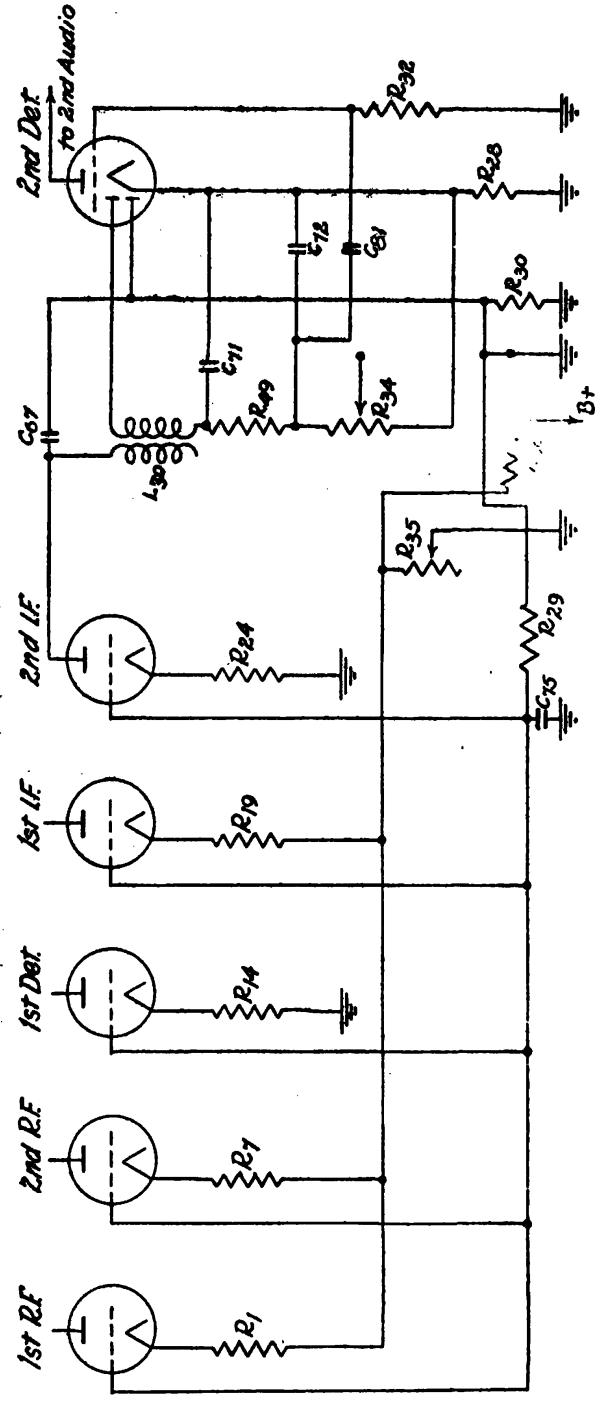
(*c*) First audio frequency amplifier.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:35 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

The vacuum tube is of the duo-diode-triode type. One of the diode plates and its associated circuit works in conjunction with the cath-



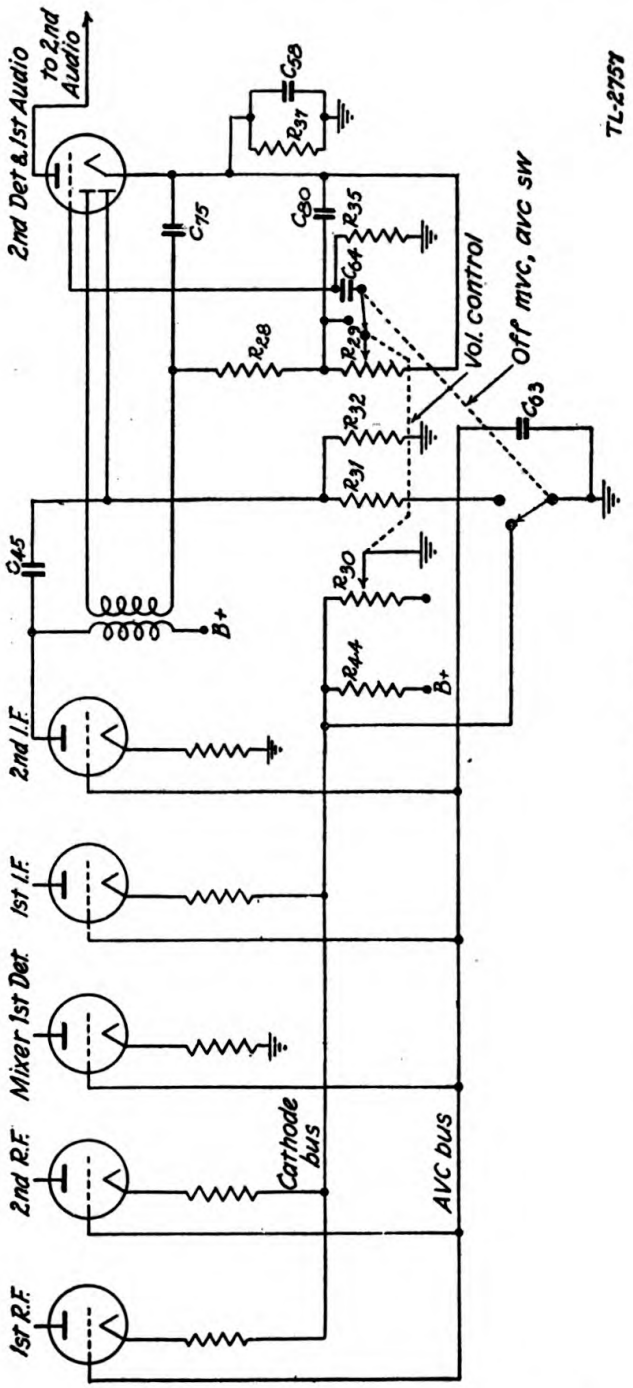
① Manual volume control.

FIGURE 35.—Radio receiver BC-312-C (functional diagram).

ode circuit of the tube to rectify a portion of the i. f. voltage, bypass i. f. voltages, and impress the resultant a. f. voltage on the triode grid of the same tube. The other diode plate with its associated

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

circuits rectifies a portion of the i. f. voltage and impresses it on the control grid circuits of the preceding stages. The use of this a. v. c.



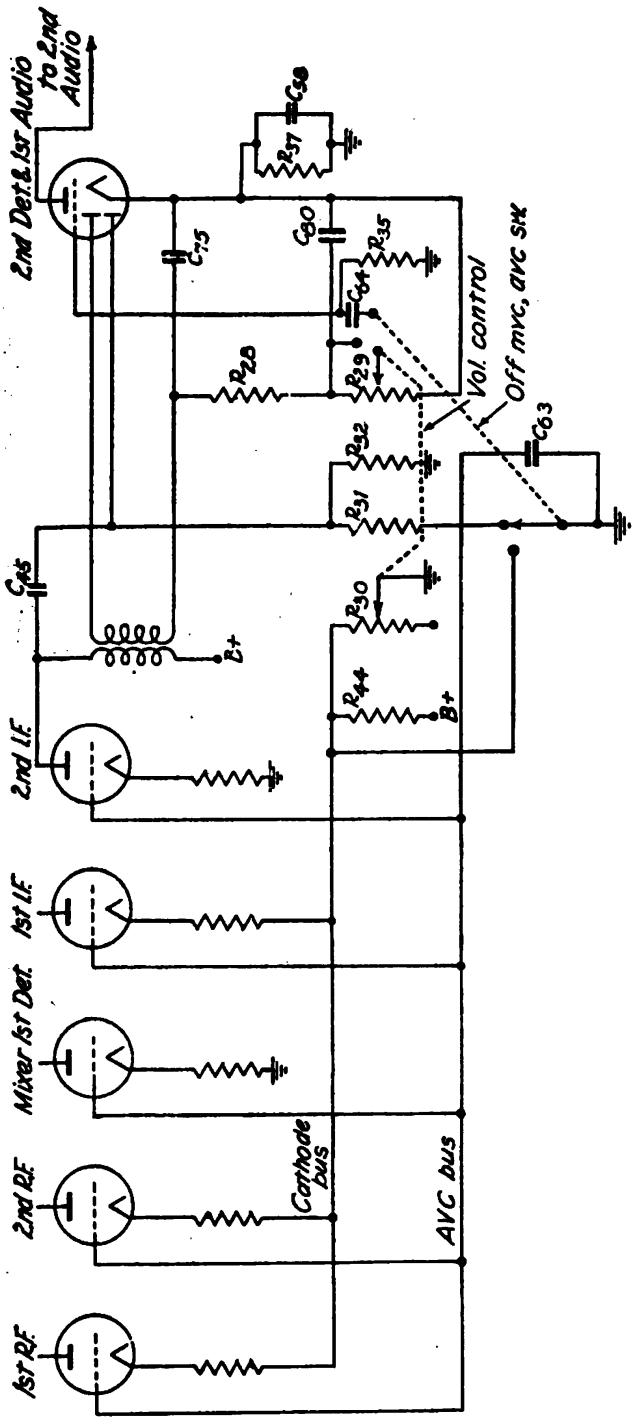
② Automatic volume control.

FIGURE 35.—Radio receiver BC-312-C (functional diagram)—Continued.

voltage is an option with the operator of the radio receivers BC-312-C and BC-314-C. The audio frequency voltage impressed on the grid of the triode section of VT-88 is amplified. Sufficient

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

power may be derived from the transformer coupling in the plate circuit of this stage to operate headphones. The voltage developed



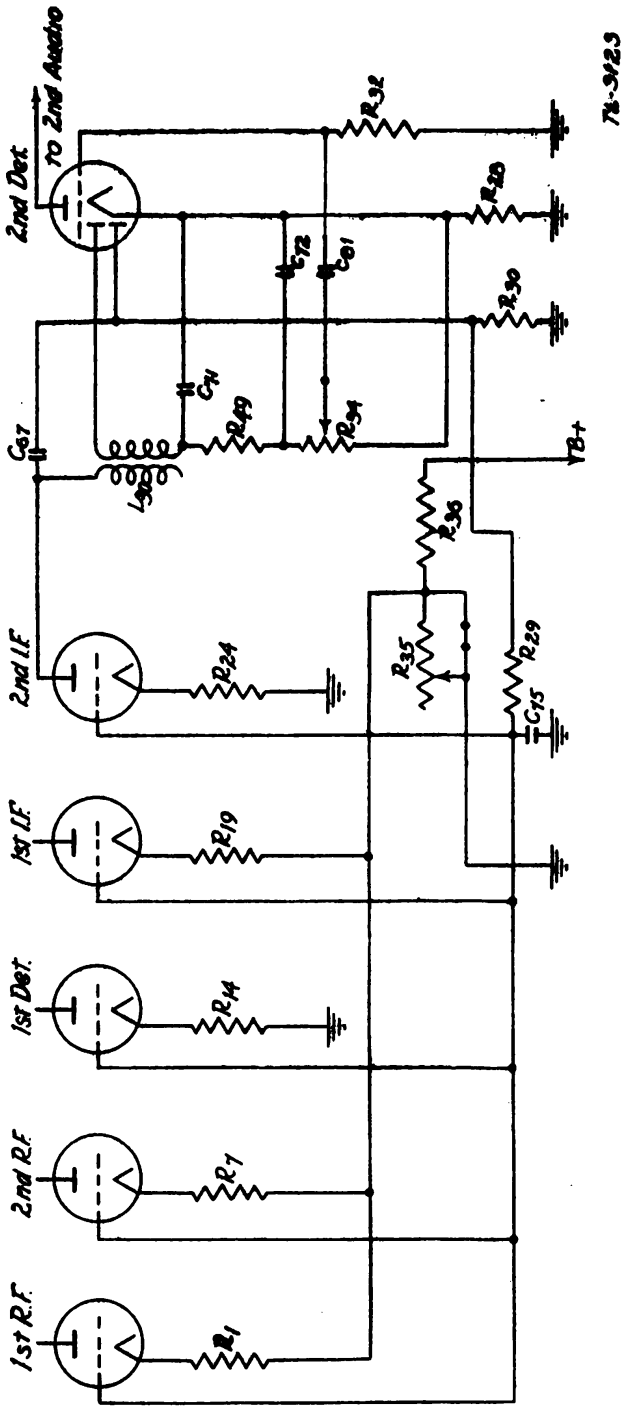
① Manual volume control.

FIGURE 36.—Radio receiver BC-314-C (functional diagram).

across the primary of the transformer of this stage is coupled by a capacitor to the 2d audio tube.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(9) *Manual volume control and automatic volume control.*—Two methods of controlling the output level of the receivers are possible.



③ Automatic volume control.

FIGURE 36.—Radio receiver BC-314-C (functional diagram)—Continued.

The OFF MVC AVC switch makes the circuit selection possible. When set on MVC the output level is entirely under the control of the manual operation of the control marked VOL. When set on

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:36 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

AVC, the control is partially automatic and partially under the control marked VOL. The relative d-c potentials of control grids with respect to the associated cathodes are controlled as follows:

(*a*) *Manual volume control* (figs. 35① and 36①).—When the OFF MVC AVC switch is set on MVC the a. v. c. bus is at ground potential. Gain is controlled through one section of the potentiometer (wired as a variable resistor and connected between cathode bus and ground) the control of which is marked VOL. The cathode bus is connected to high potential by a suitable fixed resistor. The joint action of the fixed and variable resistors biases the cathodes more or less positive with respect to ground, thus the gain is controlled. All of the a. f. voltages developed by the second detector are impressed on the control grid of the triode section of the first audio stage.

(*b*) *Automatic volume control* (figs. 35② and 36②).—When the OFF MVC AVC switch is set on AVC, the cathode bus is set at ground potential and the a. v. c. bus is freed from the ground found in (*a*) above and takes the a. v. c. voltage developed by the diode circuit furnishing an a. v. c. voltage. The gain through the receivers is now an inverse function of the a. v. c. voltage. A potentiometer ganged to the potentiometer in (*a*) above now is used to impress all or part of the a. f. voltages developed in the 2d detector circuit onto the grid of the triode section of the vacuum tube. The control for this potentionmeter is the same as in (*a*) above. In addition to the basic a. v. c. feature, the a. v. c. control of these receivers is of the "delayed a. v. c. action" type wherein no a. v. c. voltages are developed on weak r. f. signals.

(10) *Second audio stage* (figs. 32 and 33).—The second audio frequency circuit is associated with the vacuum tube position marked AUDIO and VT-66, and receives its excitation through a capacitor from the triode section of the preceding stage. There is a transformer in the plate circuit, the secondary of which is connected to jacks such that either headphones or a loudspeaker may be used to receive a. f. power from this stage.

(11) *Continuous wave oscillator* (figs. 32 and 33).—The c. w. oscillator circuit is associated with the vacuum tube position marked CW OSC and VT-65. This circuit furnishes a frequency which differs somewhat from the i. f. frequency, producing an audible beat note which makes the reception of c. w. signals possible. The frequency of the c. w. oscillator and resultant audible frequency is adjustable through a frequency range of about 4,000 c. p. s. and the control is marked CW OSC ADJUST. The CW OSC OFF ON switch

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

controls the presence of plate power to the circuit so that when set to the OFF position the circuit is not in use.

(12) *Receiving antenna relay* (figs. 30 and 31).—At such times as the SEND REC switch is set on SEND and the transmitter is keyed from the chest CH-49 in an installation of the radio set SCR-177-B, the receiving antenna relay operates on each keying pulse to short circuit the receiving antenna to ground. If the SEND REC switch of a particular receiver is set on REC the receiving antenna relay is inoperative. The purpose is to prevent extraordinarily large voltages from building up in a receiver circuit set to receive the frequency of transmission of the associated transmitter.

(13) *Dynamotor DM-21 B* (figs. 37 and 38).—Each receiver receives its high potential plate power through the action of the

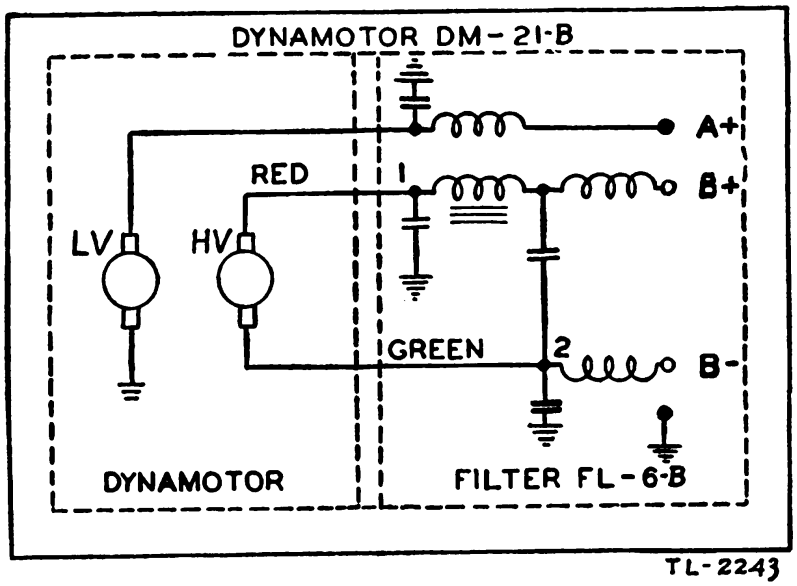


FIGURE 37.—Dynamotor unit DM-21-B with filter unit FL-6-B (schematic diagram).

dynamotor DM-21-B. The filter FL-6-B, incorporated in each dynamotor, is removable, and each dynamotor and filter is a separately replaceable unit.

34. Power unit PE-49-C.—*a. General.*—The power unit PE-49-C consists of a gasoline engine coupled to a multiple-purpose electric generator, and a control box electrically connected to the generator. A component of the unit is the filter FL-9 which may be corded to the power unit and to the radio transmitter BC-191-C.

b. Engine.—The engine is of the four-cycle, one-cylinder, air-cooled type designed to use an oil-free gasoline as the fuel. Lubrication is accomplished from an oil reservoir that forms the bottom of the crankcase. A mechanical governor provides several adjustable speeds

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

as desired. Ignition is accomplished by an integral magneto and timing mechanism. The engine is coupled to the generator through a shock absorbing device.

c. Generator (figs. 9 and 19).—The generator is provided with a high and a low voltage armature and four field windings. The

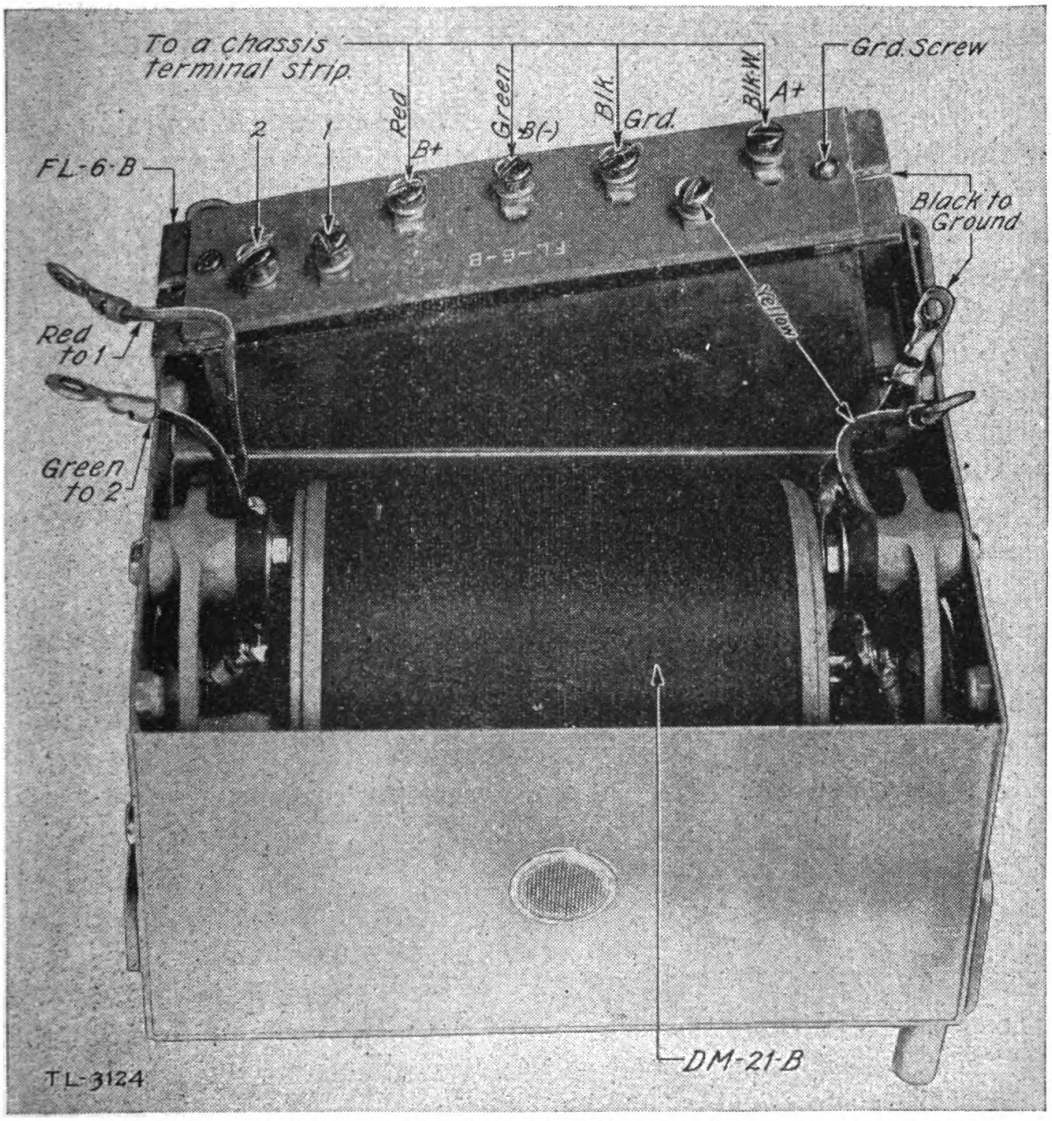


FIGURE 38.—Dynamotor unit DM-21-B, with filter unit FL-6-B partially removed.

main field winding is of the shunt type. A toggle switch located on the control box and marked FIELD SWITCH OPEN CLOSED is in series with the main field and provides for the presence or absence of field current. There is a series field in each armature output circuit of the interpole type that compensates the main field for the armature reaction produced by the many output loads possible.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

d. Starter.—The fourth field is of the series type and is connected through the armature and starter switch to the battery binding posts. Using an external battery and closing the starter switch the generator is converted to a series motor and develops sufficient torque to rotate the engine during starting operations. Under adverse conditions the main field may at the same time be energized by setting the field switch to the CLOSED position and some additional torque obtained.

e. Control box (figs. 12 and 19).—The control box contains provision for the control of the generator output in the following manner:

(1) *Switching relay.*—The switching relay (fig. 19) is remotely controlled through the cording circuits by the transmitter OFF ON switch. With the OFF ON switch set in the ON position, high and low voltage from the generator are connected to the transmitter through the switching relay contacts. When the OFF ON switch is set in the OFF position, *only* the low voltage control circuit through the switching relay appears at the transmitter and the switching relay contacts are open. (See fig. 21.)

(2) *Voltage regulating relay* (fig. 19).—In series with the main field winding of the generator is a 10-ohm resistor. This resistor is short-circuited by the break contacts of the voltage regulating relay and as the field excitation is then greater the voltage rises to a value such that the break contacts are opened and the field excitation is decreased. The action is very rapid and results in well-regulated output voltages. The relay is energized from the low voltage winding of the armature. The voltage regulating relay may be adjusted by the voltage regulating adjustment screw to give the desired operating voltage of 14.6 volts.

(3) *Reverse current relay* (fig. 19).—Located in the battery charging circuit are the make contacts of the reverse current relay (REVERSE CURRENT CUT-OUT). When the generated voltage is above a certain value the relay closes the make contacts through the action of the voltage on one of the reverse current relay windings. When the voltage falls below this value the relay opens and prevents the battery from discharging through the generator. The reverse current relay has a second low resistance winding which carries the charging current. When the flow of current is from the generator to the battery the second winding aids the first, but when for any reason the current flow is reversed, the two windings are in opposition and the charging circuit is opened.

f. Filter FL–9 (fig. 39).—All circuits are normally corded to the radio transmitter through the filter FL–9. This circuit is of the radio

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

frequency filter type employing air-cored inductors suitably by-passed to ground by capacitors. The purpose of the filter is to

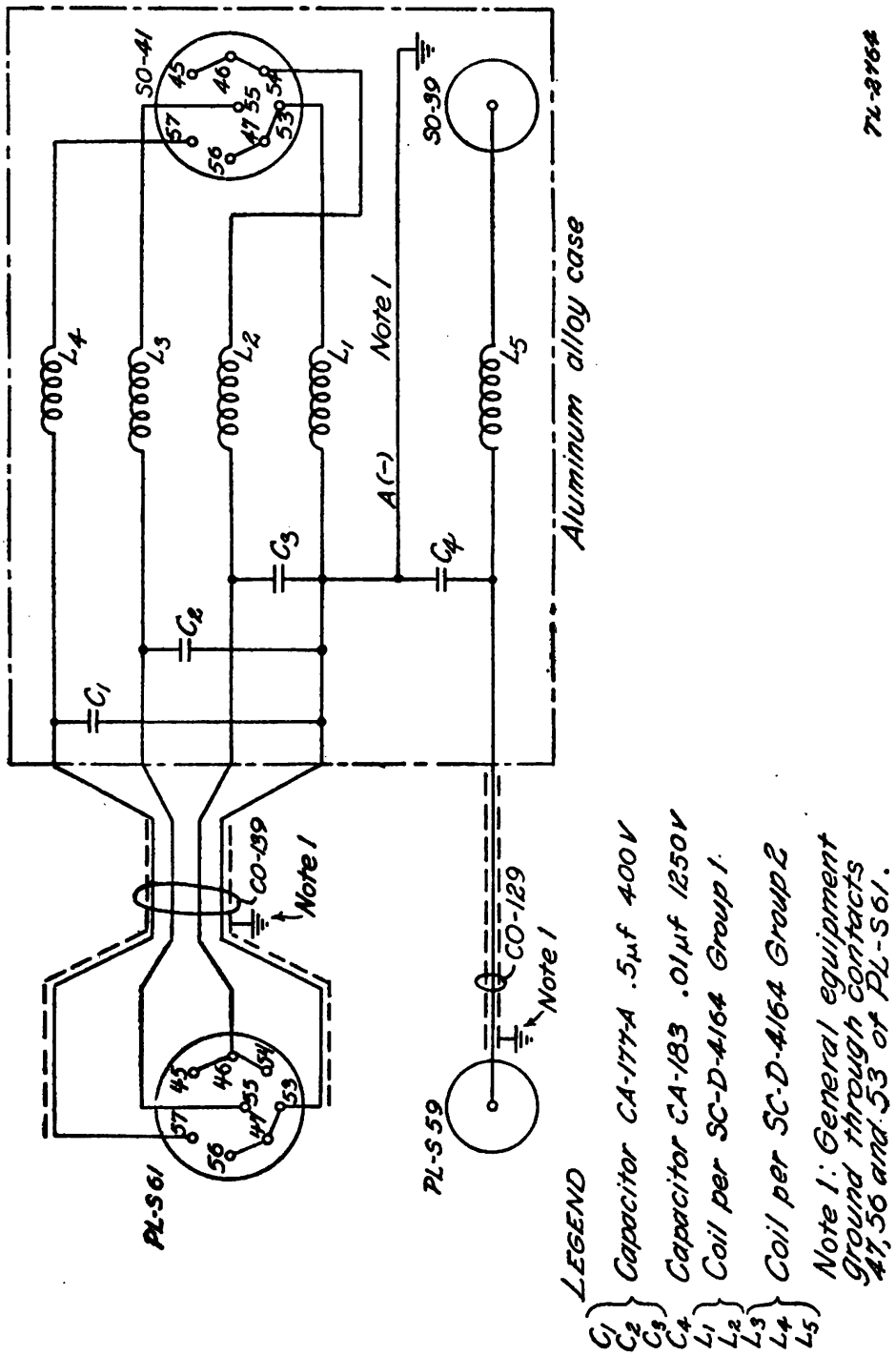


FIGURE 39.—Power unit PE-49-C, filter FL-9 (schematic diagram).

prevent electrical disturbances generated in the power unit by ignition, commutation, and voltage regulation from reaching the transmitting and receiving circuits of radio set SCR-177-B.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

g. Minor details.—Minor details of the operation of the various components of power unit PE-49-C may be obtained from the instruction book associated with the equipment.

SECTION IV

SERVICING AND REPAIR

35. Servicing.—***Caution:*** Care must be observed in servicing this radio equipment. Using personnel will make only such repairs as are indicated in paragraph 44. Servicing should be attempted only by competent personnel supplied with adequate test and repair equipment. An inexperienced operator, in attempting to locate and repair a minor trouble which a competent man could service in a few moments, may damage the equipment to such an extent as to require shipment to a depot for repair.

36. Inspections.—*a. Daily.*—Each component of the radio set SCR-177-B will be given a thorough visual inspection before and after each installation and if the same installation is used on more than one day inspections will be made before and after each daily period of operation. This inspection includes all cordage, antenna installations, power unit, batteries, and receiving and transmitting chests. All accessible components are examined for dirt and cleaned if necessary. At the end of a protracted period of use the batteries BB-46 are given a careful examination to include electrolyte and gravity tests of each cell. The power unit will be inspected for loose screws, bolts, and nuts, and freedom of moving parts.

b. 50-hour.—A thorough inspection of the complete installation will be made after every 50 hours of operation. This materially aids in securing uninterrupted performance in the field. The procedure for this inspection is as follows:

(1) Check to see that the storage battery is at the proper specific gravity and that the charging circuits of PE-49-C and regulator are adjusted so as to charge the battery properly.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(2) Clean the accumulated dust and dirt from all units, using an air hose or bellows, paying particular attention to the loading coil, item 1170, in the antenna compartment of the radio transmitter. Inspect the rotating coil, item 1167, in this compartment and clean the winding thoroughly with carbon tetrachloride and a clean cloth. The rod (only) on which the wheel runs should be touched in several places with oil dag to insure smooth operation. ***Caution:*** Do not leave a surplus of oil dag such that the wheel and track surfaces can become contaminated by the lubricant.

(3) Make certain that all wiring is in place, that all mounting brackets and supports are rigidly fastened, and that all nuts and machine screws are supplied with lock washers and are tight.

(4) Determine that the cords are not damaged and all ground connections are secure.

(5) Inspect plugs for proper fit and sockets for compressed pin springs. Pin springs which have taken a permanent set can usually be restored by a *very* light hammer blow at the end of the pin.

(6) Make certain that all cartridge fuses are held tightly in their clips. A loosely held fuse should be removed and the clips bent by hand until they grip the fuse tightly. Clean clips and fuse ends. Clean all contact surfaces.

(7) Inspect the high voltage fuses by removal from the mounting. Carefully clean all contact surfaces and replace the fuses.

(8) Inspect the antenna system for broken or frayed leads or damaged mast sections. Wipe the insulators clean. Make sure that antenna leads have not been bent close to metalwork where high antenna voltages might cause sparkovers.

(9) Inspect keys and microphones for defective cords and damaged plugs.

(10) To inspect the receiving dynamotor DM-21-A it is necessary to remove the receiver chassis from its cabinet.

(*a*) *Carefully* place the receiver upside down on a servicing bench with the dynamotor corner of the chassis next to the service man. Remove the two knurled screws and two flathead screws from the dynamotor housing cover.

(*b*) Check the color coding of the physical wiring against that noted in figure 38 and make a *written* note of any differences. Remove the wires attached to the filter unit FL-6-B going to the terminal strip located on the front of the panel but not from the panel terminal strip. Likewise remove the wires from the filter FL-6-B going to the dynamotor.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Caution: Always place all screws, washers, lockwashers, and small parts freed in the disassembly of apparatus in a suitable container so that such small special items will not become lost before assembly takes place.

(*c*) *Carefully* place the chassis face down with the top of the chassis toward the service man. Remove two long fillister headscrews leading through the stand-off studs (see fig. 40) to the dynamotor housing. One fillister headscrew is located near the 1st i. f. tube socket and the other near the 2d i. f. tube socket. Two removable stand-off studs may now be worked out of position. Remove the two long screws from the hinge-like brackets and the dynamotor housing may be worked free of the bracket.

(*d*) Remove the four flat headscrews from each end of the dynamotor housing that fasten in the U-brackets holding the four rubber mounting grommets. The dynamotor may now be worked from the housing.

(*e*) To remove the brushes for inspection, remove the cotter pin, unscrew the castellated plug, and work the spring fitting of the brush out of the brush holder. Be careful not to break the soldered pig tail connections.

(*f*) The dynamotor may now be inspected for—

1. Free rotation.
2. No end play.
3. Mechanical adjustments.
4. Brush wear.
5. Brush bearing (70 percent or better contact with commutator).
6. Brush free to move in holder.
7. Grooved commutator.
8. Broken leads.
9. Soldering of commutator should not show signs of softening.
10. All circuits free from ground.
11. No electrical interconnection of high and low voltage armatures; that is, there should be infinite resistance between high and low voltage commutator bars.

(*g*) Defects observed under *7*, *9*, *10*, and *11* above require replacement of dynamotor; those under *1*, *2*, *3*, *4*, *5*, *6*, and *8* above may usually be corrected by lubrication, adjustment, brush replacement, and "sanding-in" operations. A grooved commutator may be repaired if machinist personnel experienced in commutator turning are available. Old brushes with less than 70 percent bearing on the commutator or new brushes may require sanding to fit. Clamp the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

assembled dynamotor *only* lightly in a vise and slip a strip of very fine sandpaper, slightly wider than the brush, between the commutator and brush, with the sand side next to the brush. Allow the paper to lie curved around the commutator and seesaw the paper. Sand the brushes just sufficiently to produce good contact curvature. A slightly pitted commutator may be cleared up by running the dynamotor and sanding the commutator, using sandpaper and a thin, square-ended wooden stick to apply sandpaper to the commutator. Do not sand the soldered end of the commutator. Clean well after sanding and use no oil on the commutator either during or after sanding-in.

(11) Upon completion of an inspection, all plugs and sockets should be completely reengaged and screwed down tightly. All tubes should be inserted all the way into their corresponding sockets and grid-cap connections, if any, firmly made. Chassis should be effectively locked in their boxes by means of the locking catches on the front panels.

(12) Inspect the storage compartment located in the hood of the power unit PE-49-C for surplus oil and dirt. This compartment should be maintained free of oil and dirt and should contain the following tools and spare parts:

Quantity	Name of item	Manufacturer's designation
1	Piston pin	63615.
1	Connecting rod assembly	29269.
1	Piston assembly	99153.
1	Exhaust valve	63617.
1	Intake valve	63616.
2	Valve springs	65906.
1	Spark plug	7 B. C.
1	Starter rope	69932.
1	Flywheel puller	29157.
1	Fuse, high voltage	FU-20.
1	Fuse, low voltage	FU-13.
6	Fuse links, renewable	M-160.
1	Tube for fuse refills	PE-49-40.
2	Fuse caps for tube	20-690.
	1 Set gaskets in waterproof envelope, including—	
1	Base gasket	67127.
1	Cylinder head gasket	29290.
1	Valve cover gasket	65237.
1	Crankcase cover	67137.
1	Gas filter gasket	67267.
1	Magneto plate gasket	66457.
1	Air cleaner gasket	67247.

328275°—41——7

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Quantity	Name of item	Manufacturer's designation
	1 Set gaskets in waterproof envelope, including—Con.	
1	Intake elbow gasket	65647.
1	Carburetor nozzle gasket	68667.
1	Carburetor body gasket	68947.
	1 Set generator brushes in waterproof envelope, including—	
2	Generator brush, spring and cap, high voltage	G-3740.
2	Generator brush and lug assembly, low voltage	G-3738.
	1 Set tools and open-end wrenches in tool bag—	
1	13/32 x 5/16	21.
1	7/16 x 3/8	723.
1	9/16 x 1/2	725B.
1	11/16 x 9/32	27.
1	3/4 x 5/8	729.
1	Cadmium finish pliers	90.
1	Screw driver (small stub)	223B.
1	Screw driver (large, 5-inch)	5813.
1	Hammer, 12-ounce	2300.
1	1/8-inch pin punch	1941.
1	1/4-inch socket setscrew wrench	68652.

37. Receiver vacuum tubes.—The vacuum tubes used in radio receivers BC-312-C and BC-314-C normally have an effective life of 2 to 3 years. However, to insure best performance of the receiver, they should be checked with an accurate tube checker. Tubes should be checked annually and particularly just prior to extended use in the field. Those which do not come up to standard should be replaced, the receiver carefully checked for performance, and circuits realined if necessary.

38. Lubrication.—Lubrication should be in accordance with the chart below. *Do not use excessive amounts of oil or grease and do not allow electrical connections to become greasy.* Excess lubricant in dynamotors will tend to work out of bearing housings and onto commutators where it will cause trouble. It also may cause the bearings to overheat. Make sure that lubricants and oilholes are clean and free from sand, grit, or dirt. These abrasives are the chief causes of bearing wear and the necessity for bearing replacement.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:44 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Lubrication chart

Apparatus	Points of lubrication	Lubricant to be employed	Quantity of lubricant	Service periods	Special instructions
Dynamotor DM-21-B.	Oil cups	SAE 10 mineral oil	One drop each bearing.	500 hours	These bearings are of sealed, ball-bearing type, packed with grease at the time of manufacture. Any oil above the stated amount will do more harm than good.
	Ball bearings	High temperature ball bearing grease 295 grade Air Corps specification No. 36-50; "Refined calol grease" made by New Departure Mfg. Co.; grease made by N. Y. & N. J. Lubricant Co.	As required by special instructions.	Whenever armature is removed and replaced.	See par. 36*b*(10) for the removal of DM-21-B from the receiver chassis. The end brackets are next removed and the armature withdrawn from position. The quantity of grease should be sufficient to cover thoroughly the ball bearing assembly surfaces. Excess grease should be removed.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Lubrication chart—Continued

Apparatus	Points of lubrication	Lubricant to be employed	Quantity of lubricant	Service periods	Special instructions
Radio receiver BC–312–C and BC–314–C.	Gears and bearings of band change mechanism and capacitor drive.	Petrolatum	Sufficient to permit quiet, smooth drive of mechanism involved.	When required	The various gears and bearings of the radio set chassis are lubricated at the time of manufacture with a sufficient amount of lubricant to last the life of the equipment and unless operated in an abnormal manner should never require lubrication. In the event that such lubrication becomes necessary, petrolatum should be very sparingly used.
Radio transmitter BC–191–C, and transmitter tuning unit TU–3–A, TU–5–A, and TU–6–A.	Switch shafts	SAE 20 mineral oil	Very thin film	Whenever apparatus is removed from service and thoroughly cleaned.	
	Switch contacts; switching relay.	White petroleum jelly.	do	Whenever apparatus is to be removed from service and thoroughly cleaned.	

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Power Unit PE–49–C engine.	Crankcase	Mobiloil "Arctic" SAE–20.	Fill oil reservoir	30 hours operation	Drain old oil thoroughly. This is best accomplished when the engine is still warm at the end of a running period.
Governor and throttle rod.	Points of pivot and motion.	SAE–20	3 to 4 drops	As needed	Governor assembly should be free and should display no inclination to stick.
Oil bath air filter	Oil reservoir container.	SAE–20	To oil level marking.	At the end of each period of use. 50 hours or oftener as needed.	Immerse in kerosene or gasoline and allow to drain dry before refilling with clean oil.
Generator	End bearings	Lubricant S–58 as made by N. Y. & N. J. Lubricant Co. or equivalent.	Filled bearing space without excess.	30 months	Disassemble the end bells from the generator, clean and repack the bearings without excess lubricant.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

39. Special adjustments to radio transmitter BC-191-C.—*a. Auxiliary equipment.*—The following auxiliary apparatus should be used to adjust properly radio transmitter BC-191-C. This auxiliary apparatus is not issued as a component of these sets but must be obtained elsewhere.

(1) One frequency meter set SCR-211-A.

(2) One radio frequency ammeter (0-1 ampere full scale).

(3) One 100-micromicrofarad capacitor, either fixed or variable, capable of withstanding at least 2,500 or 5,000 volts d-c.

(4) One noninductive resistor of approximately 10 ohms, capable of carrying 1 ampere.

NOTE.—The capacitor, resistor, and r. f. ammeter are connected in series and the combination connected between the antenna and ground binding posts of the transmitter to form a dummy antenna load for the transmitter.

b. Neutralization.—Radio transmitter BC-191-C is adjusted for neutralization by the manufacturer and normally will never require adjustment in the field. When necessary, neutralization may be checked and adjusted as follows:

(1) Turn the transmitter OFF-ON switch to the OFF position.

(2) Remove the tube compartment shield.

(3) Remove the power amplifier tube VT-4-C from its socket and cover *one* and only *one* filament pin with a piece of paper and replace the tube. (When the transmitter is turned on the power amplifier filament should not light.)

(4) Connect the dummy antenna (see note in *a* above) in series with the radio frequency ammeter to the transmitter.

(5) Place the TONE CW VOICE switch on CW.

(6) Set the MO TUNING and PA TUNING controls for the center of the frequency band in accordance with data on the calibration chart. (600 kc. when TU-3-A is employed, 2,250 kc. when tuning unit TU-5-A is employed, or 3,750 kc. when tuning unit TU-6-A is employed.)

(7) Turn the transmitter OFF-ON switch to the ON position.

(8) Tune the antenna circuit to resonance as prescribed in paragraph 25*b* and *c*, inclusive, using the O-1, r. f. ammeter in the dummy antenna to provide the indication of resonance.

(9) Adjust the control marked PA TUNING until the O-1, r. f. ammeter in the dummy antenna circuit indicates a maximum current in the dummy antenna.

(10) Remove the calibration chart by turning the four knurled screws at the corners.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(11) Unlock the neutralizing capacitor lock by turning with a screw driver the lock to the left one quarter turn.

(12) Rotate the neutralizing capacitor control until the current as read by the radio frequency ammeter in the dummy antenna is reduced to zero.

(13) Slightly readjust the antenna and power amplifier circuits to be sure that they are on resonance. If the ammeter in the dummy antenna shows an increased reading, repeat the operations (8) through (12).

(14) Lock the final positions of the neutralizing capacitor adjustment, replace the calibration chart, and restore the transmitter for normal operation. The tuning units will each be neutralized when the neutralizing capacitor is approximately one-half engaged.

c. Speech amplifier grid bias adjustment.—The grid bias on the speech amplifier in radio transmitter BC-191-C is adjusted by the manufacturer and seldom requires readjustment in the field. The adjustment is not critical. Should the initial setting become displaced, remove the tube compartment, and set the S. A. BIAS control between 6 and 7.

d. Calibration reset.—The calibration of the transmitters should be checked periodically, employing the frequency meter SCR-211-A for the purpose. It is most important that the calibration be checked whenever the master oscillator tube is changed. If the check indicates that the transmitter varies more than 25 kilocycles from the frequency indicated on the calibration chart, the oscillator frequency should be adjusted as follows:

(1) Warm up the transmitter for at least 30 minutes, with the antenna tuned for rated output, prior to adjusting.

(2) Set the frequency meter set SCR-211-A to 800 kc. when transmitter tuning unit TU-3-A is used, or to 3,000 kc. when transmitter tuning unit TU-5-A is used, or 4,500 kc. when transmitter tuning unit TU-6-A is used.

(3) Adjust the transmitter for operation on c. w. at a frequency of 800 kc. or 3,000 kc. or 4,500 kc., as the case may be, as prescribed in paragraph 25*c*. Use data from the calibration chart for the setting on the control MO TUNING and approach this setting from the lower dial readings.

(4) Open the calibration reset port located on the right of the TEST KEY (fig. 4) and with a screw driver adjust the calibration reset capacitor 1104 until the transmitter zero beats with the frequency meter.

(5) Close the calibration reset port.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

40. Alinement.—*a. General.*—(1) *Preliminary considerations.*—The alinement of a superheterodyne radio receiver is a detailed task that requires a thorough knowledge of all principles involved, the proper auxiliary instruments, suitable tools, and other maintenance bench facilities. Alinement should not be undertaken until definitely required and all other repairs are completed. The alinement of radio receivers BC–312–C and BC–314–C by organizations other than those repair organizations authorized to make extensive repairs, under provisions of the status letter X of appendix C of the Signal Corps General Catalog, will *not* be attempted.

(2) *Equipment for alinement operations.*—The alinement of the superheterodyne radio receiver will require the following apparatus:

(*a*) Standard signal generator (I–72–B or equivalent).

(*b*) Output meter.

(*c*) Head set or loudspeaker.

(*d*) Dummy antennas (50 $\mu\mu$f, r. f. alinement; 250 $\mu\mu$f, r. f. alinement below 1,500 kc.; 300 ohm resistor, i. f. alinement).

(*e*) Frequency meter (SCR–211–A or equivalent).

(*f*) Test set I–56–A.

(*g*) Miscellaneous tools (screw drivers, socket wrenches, and neutralizing tools).

(*h*) A plug PL–114 (or equivalent) wired for the introduction of battery power to the receiver.

(*i*) Suitable test bench with auxiliary 12-volt storage battery (BB–46 or equivalent).

(3) *General test conditions.*—A standard signal-to-noise ratio of 4:1 should be employed. Standard output power should be taken as 10 mw. Standard load should be 4,000 ohms. Type of signal source should be modulated r. f. for all but MVC CW operation. Modulation frequency should be 400 cycles. Modulation percentage should be a minimum of 30 percent. Power supply voltage should be 14 volts d. c.

(4) *Calibration of test equipment.*—In the r. f. and i. f. alinement of military radio receivers a high degree of accuracy is desired without employment of excessive time. Thus, considerable time can be saved by employing a frequency calibrated signal generator wherein the accuracy of calibration is of the order of 0.02 percent. If this procedure is followed, frequency checks should be all that are necessary to keep the equipment in first class operating condition. The SCR–211–A frequency meter may be used directly to calibrate such radio receivers but only at a considerable sacrifice of time, and it is doubtful whether the results will be superior to the method employ-

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ing a calibrated standard signal generator. The actual manner of calibrating a standard signal generator with the SCR-211-A frequency meter set is as follows: The output of the signal generator should be connected to the antenna post of the frequency meter through a capacitor. A headset should be inserted in the frequency meter. Adjust the output of the signal generator to 100 microvolts at the frequency 470 kc. and adhere to the procedure given below. Use 92.5 kc. instead of 470 kc. for radio receiver BC-314-C.

(*a*) Set the frequency band switch to LOW (POWER and CRYSTAL switches ON), and correct the heterodyne oscillator to calibration at the 181.8 kc. crystal check point for 470 kc. check.

(*b*) Loosely couple the frequency meter antenna to the r. f. source, and turn the CRYSTAL switch to OFF.

(*c*) Search through the LOW band, listening carefully for beat notes while the frequency meter tuning dial is slowly turned from the low to the high end.

(*d*) If only one loud beat note is heard between 125 and 250 kc., determine the heterodyne oscillator fundamental frequency corresponding to the zero beat point dial setting (left-hand columns of the calibration book). The frequency so indicated is approximately the unknown frequency.

(*e*) If more than one loud beat note is heard, consecutive harmonics of the heterodyne are beating with the fundamental of the unknown frequency. For example, if the unknown frequency were 1,000 kc., consecutive harmonic beat notes would be obtained at the eighth harmonic of 125 kc., the seventh of 142.8, the sixth of 166.7 the fifth of 200, and at the fourth of 250 kc.

(*f*) Determine the heterodyne oscillator fundamental frequencies corresponding to the dial settings for any two adjacent consecutive harmonic zero beat points and apply the equation:

$$\frac{f_L \times f_H}{F_H - f_L} = \text{approximate unknown frequency}$$

where f_H= the higher heterodyne oscillator fundamental, and f_L= the lower heterodyne oscillator fundamental. If no usable consecutive harmonic beat notes are found in the LOW band, switch to the HIGH band and correct the heterodyne oscillator to the 3,000 kc. crystal check point.

(5) *Preparation of receivers for alinement and calibration.*—The receiver should be removed from the cabinet and turned upside down. Remove the fillister headscrew in the dynamotor mounting hinge nearest the center of the set (see fig. 40). Turn the radio receiver

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

right side up and loosen the two fillister headscrews, fastening the spacers in place. These spacers may easily be removed when the screws are removed. Turning the radio receiver upside down enables the dynamotor unit DM-21-B to be swung on the hinge, as in figure 41, and this procedure permits inspection of the compartment parts located underneath the dynamotor. It may be necessary to carry this still further and separate the dynamotor unit completely from the chassis by the removal of the other hinge screw. This latter action is dependent upon whether the alinement tools available are suitable for the adjustment of the under chassis screw of the 2d i. f. transformer. ***Caution:*** If the dynamotor is to be removed from all chassis mountings during the progress of alinement, care should be taken that the full weight of the dynamotor unit does not stress the attached leads. It is assumed that all r. f. and i. f. tubes including the second detector have average constants. A tube checker should be employed to determine the serviceability of all tubes before alinement. Any needed repair or servicing of the receiver should precede alinement.

(6) *Precautions to be taken.*—Radio receivers BC-312-C and BC-314-C require preheating for a period of at least 1 hour prior to attempting alinement. This is to permit stabilization of the radio frequency circuits in order that the alinement can proceed without rechecking. It is also advisable to operate the signal generator for a period of approximately 1 hour prior to use as a frequency calibrating device in order that optimum stabilized conditions may be obtained. While not generally realized, the frequency of all forms of test equipment may drift appreciable amounts during the initial warm-up time and hence the precaution above is highly advantageous and permits quicker operation throughout the actual alinement. In connecting the receiver for alinement and calibration, extreme care should be taken so that the sensitive meter located in the signal generator is not short-circuited by the power supply employed by the receiver. Certain designs of signal generators are particularly susceptible to burn-out of attenuator and meter if care is not taken in properly grounding the instruments. Thus, a check should be made to ascertain that the same side of the line is grounded in both the signal generator and receiver. Because no fuses are provided in the output circuits of signal generators, personnel must be extremely careful in handling this class of equipment. Furthermore, the receiver should be placed as close as possible to the signal generator and connected thereto through short leads. Excessively long leads

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:45 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

from signal generator to radio receiver serve no useful purpose and are likely to produce erratic results in the actual alinement.

b. Receiver markings.—(1) *R. f. letter marking.*—Radio receiver BC-314-C has four band positions. The trimmer capacitor adjustment screws associated with each band are similarly marked by letters A through D inclusive. The radio receiver BC-312-C, having six band positions, is likewise marked by letters A through F. Figures 40, 41, and 42 show typical markings.

(2) *R. f. capacitance markings.*—The trimmer capacitor adjustment screws, in addition to the band letter markings show the relative

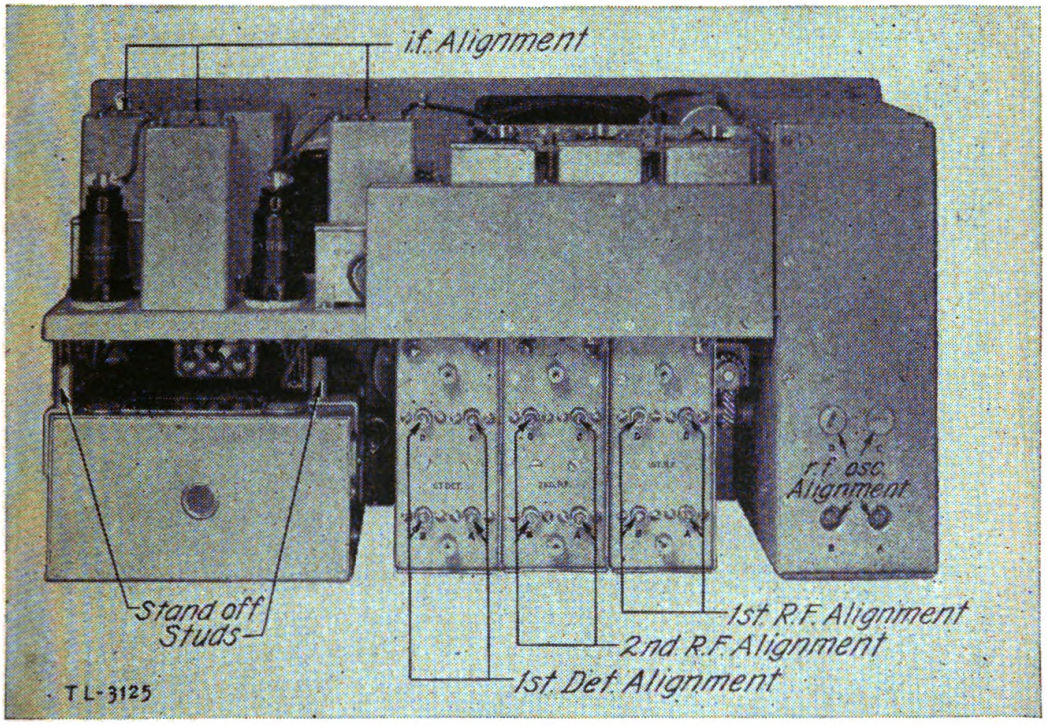


FIGURE 40.—Radio receiver BC-314-C, rear view, r. f. alinement shield removed.

value of capacitance included in the circuit. A red dot is located on one side of the screw driver slot in the end of the screw. The capacitor is of the air-padder type composed of a stator and a rotor. The capacitor may be rotated 360° at which time the initial capacitance value is repeated. With the receiver in a normal upright position, stator plates are located below the center line so the capacitance is minimum when the red dot is above the center line, and likewise when the red dot is below the center line the capacitance is maximum.

(3) *I. f. markings.*—Each i. f. transformer is marked on the top of the container with its functional purpose as follows:

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

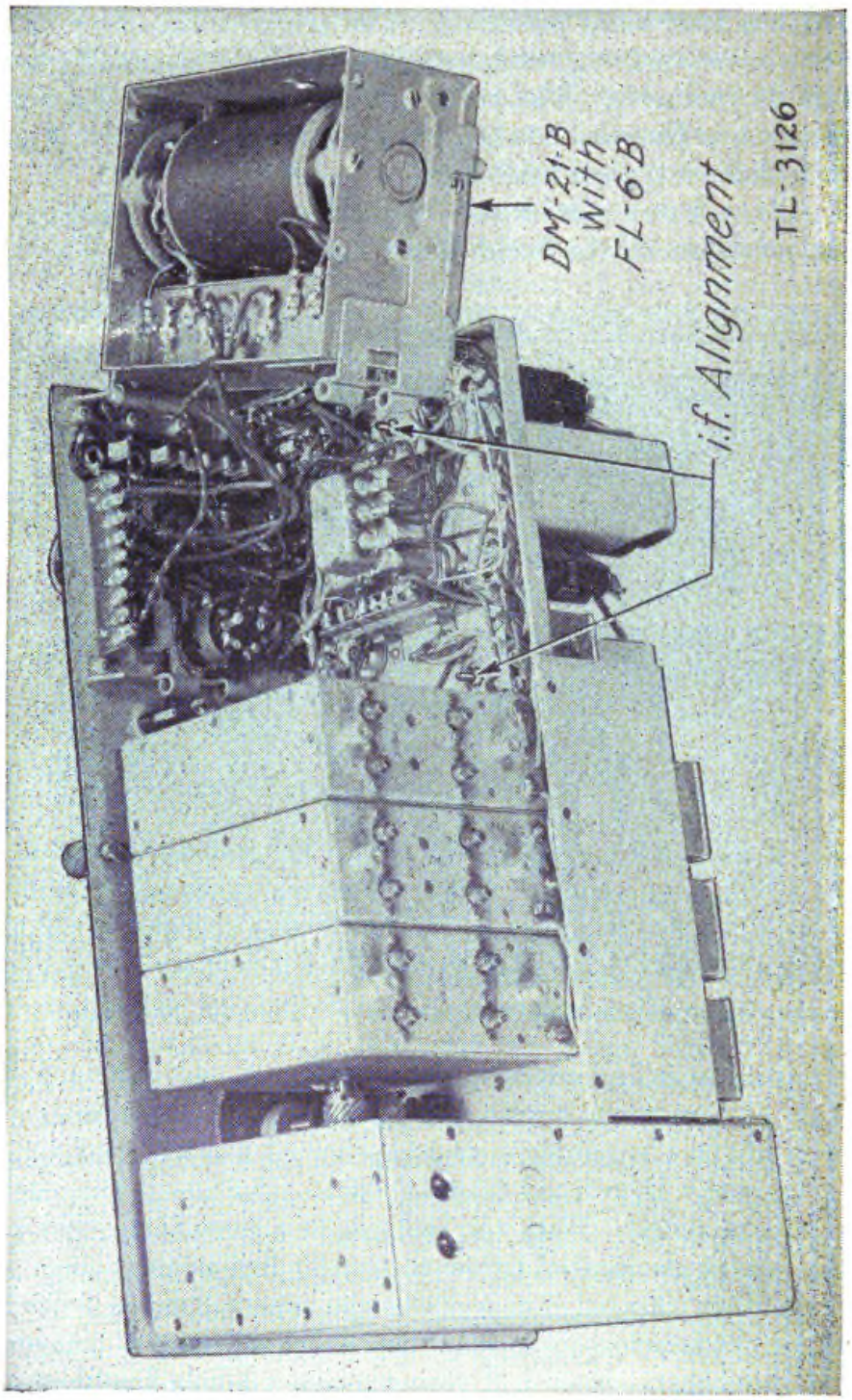


FIGURE 41.—Radio receiver BC-314-C, partial disassembly.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

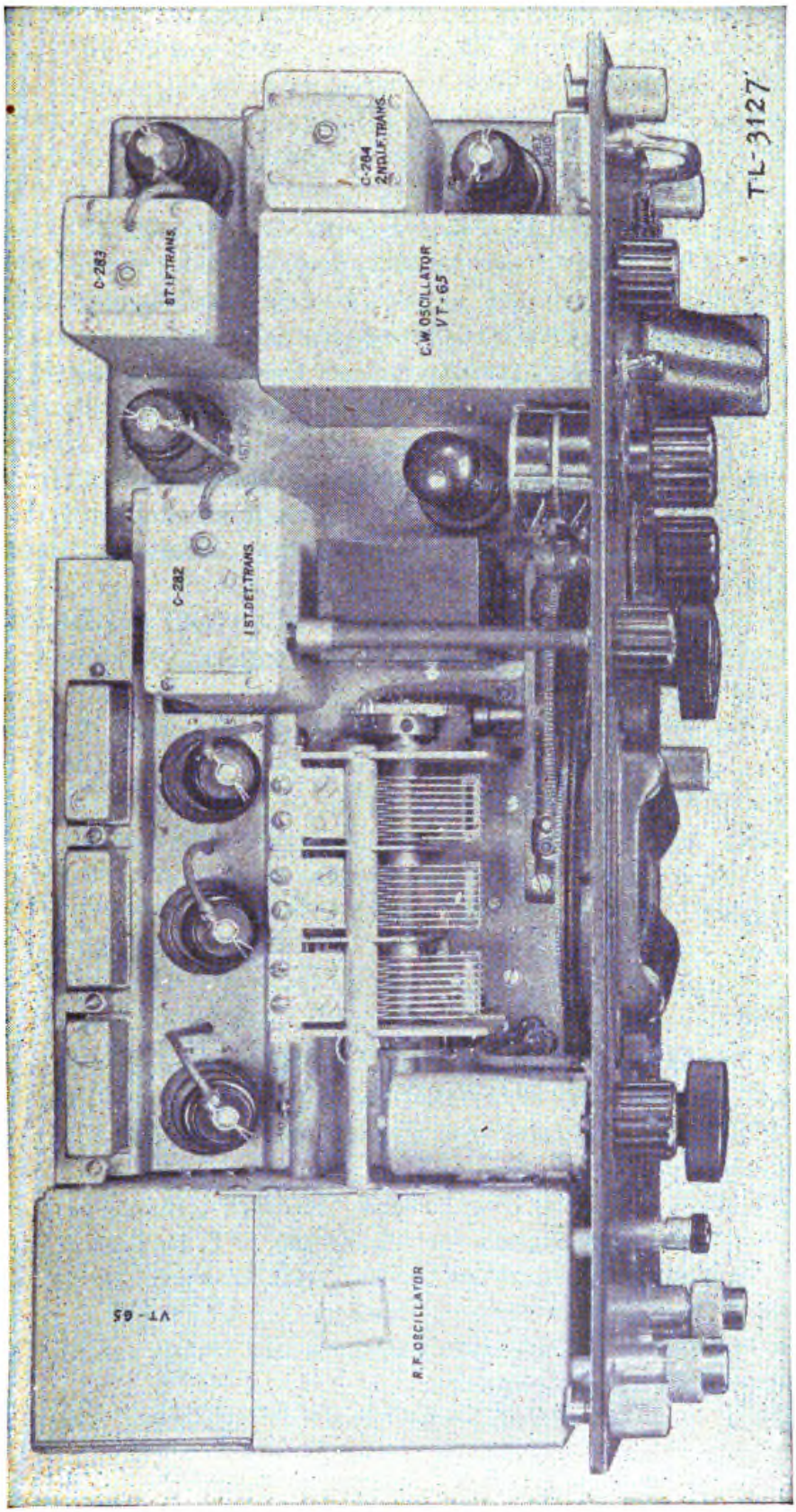


FIGURE 42.—Radio receiver BC-312-C, view from above.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*a*) For the radio receiver BC-314-C the markings are 1ST DET TRANS and C-292, 1ST IF TRANS and C-293, and 2D IF TRANS and C-294. On the top of each transformer is an adjustment screw. On the under side of the chassis are adjustment screws for C-292 and C-294 (there being no such under side adjustment for C-293).

(*b*) For the radio receiver BC-312-C the markings are 1ST DET TRANS and C-282, 1ST IF TRANS and C-283, and 2D IF TRANS and C-284. On the top of each transformer and under the chassis is a total of six adjustment screws. C-282 also contains the crystal phasing circuits. For both receivers these adjustment screws operate upon the iron cores of the i. f. transformer as the means of adjustment. Each adjusting screw is locked in place by a locknut of the elastic nut type.

Caution: All of the r. f. and i. f. adjusting screws are held in place by either elastic nuts or split screw type locknuts and any attempt to adjust the screws without first releasing the locknut may result in damage to the adjusting screw.

c. I. f. and r. f. peaks.—Radio receiver BC-312-C and BC-314-C utilize radio frequency and intermediate frequency maximum peak voltages for alinement as follows:

(1) *Radio receivers BC-312-C.*—(*a*) I. f. alinement frequency, 470 kc.

(*b*) *R. f. alinement frequency:*

Band:	*Aline frequency, kc.*
A	2,900
B	4,900
C	7,850
D	11,000
E	13,750
F	17,700

(*c*) On bands A, B, and C the r. f. oscillator operates at a frequency 470 kc. above the r. f. signal being received, and on bands D, E, and F the r. f. oscillator operates 470 kc. below the r. f. signal being received.

(*d*) On bands A, B, and C set the r. f. oscillator trimmer capacitors for the minimum capacitance for which the r. f. oscillator can be peaked. In a similar manner set the r. f. oscillator trimmer of bands D, E, and F for the maximum capacitance for which the r. f. oscillator can be peaked. This action automatically avoids getting the r. f. oscillator at an image frequency.

(2) *Radio receiver BC-314-C.*—(*a*) I. f. alinement frequency, 92.5 kc.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(*b*) *R. f. alinement frequency.*

Band:	*Aline frequency, kc.*
A	255
B	440
C	800
D	1,450

(*c*) On all bands the r. f. oscillator operates at a frequency 92.5 kc. above the r. f. signal being received.

(*d*) In all cases set the r. f. oscillator trimmer capacities for the minimum capacitance for which the r. f. oscillator can be peaked.

(*e*) In event that a signal generator calibrated to deliver 92.5 kc. is not available for the alinement of the i. f. stages of radio receiver BC-314-C, a substitute will have to be obtained. A frequency of 92.5 kc. may be obtained by mixing the output of an oscillator such as I-72-B and the output of a second oscillating circuit such as the low band fundamental of the frequency meter set SCR-211-A. If the two oscillators are set to give a difference frequency of 92.5 kc. and introduced into the i. f. stages of the radio receiver through a nonlinear device, a signal of 92.5 kc. will be generated. The control grid and plate circuit of the mixer tube or either i. f. tube will function as such a nonlinear device if the signal is introduced at the control grid. By this procedure the frequency can be set with a high degree of accuracy using the frequency meter to calibrate the signal generator. The necessary audio modulation may be obtained from the modulation provision of the signal generator I-72-B.

d. Radio receivers BC-312-C and BC-314-C.—(1) *Procedure.*—With the receiver connected for operation outside its case, the volume control should be adjusted to maximum volume employing MVC operation, and the crystal filter phasing control should be placed in the OUT position if incorporated within the receiver (radio receiver BC-312-C only). A warm-up period of at least 1 hour should be allowed. At the end of this period proceed with the alinement in the following order:

(*a*) Second i. f. transformer.
(*b*) First i. f. transformer.
(*c*) First detector output transformer.
(*d*) C. w. oscillator.
(*e*) Crystal filter (employed in BC-312-C).
(*f*) R. f. oscillator.
(*g*) Grid circuit of the first detector.
(*h*) Grid circuits of preceding r. f. stages.
(*i*) Antenna alinement capacitor.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(2) *I. f. alinement.*—(*a*) If the i. f. stages are not too far out of alinement, the i. f. voltage from the signal generator may be introduced at the grid cap of the mixer tube. This voltage should be introduced to the mixer stage through a 300-ohm series resistor (dummy antenna) with the grid cap in place and the ground side of the signal generator connected to the chassis ground. Aline the i. f. circuits in sequence beginning with the second i. f. transformer and working back toward and including the first detector output transformer. Always use the least signal generator voltage for which a good resonance indication may be obtained. In event that major repairs have been made on the i. f. stages, the i. f. circuits may be too far out of alinement to use this procedure; then proceed as in (*b*) below.

(*b*) Attach the 300-ohm dummy antenna from the signal generator to the grid cap of the second i. f. tube. The ground terminal from the signal generator should be connected to the receiver chassis. Adjust the second i. f. transformer for maximum response at the desired i. f. frequency, using a modulated wave as heretofore specified. If for any reason this circuit will not peak at the frequency specified, a check should be made to determine the cause of this trouble before continuing with the alinement. Next, connect the dummy antenna to the grid of the first i. f. tube. Replace the grid lead of the second i. f. tube and aline the first i. f. transformer by tuning both adjustments for maximum response. Here again, as in the case with the second i. f. transformer, if a maximum response effect cannot be obtained, circuit continuity should be checked prior to continuing the alinement process. Next, attach the dummy antenna to the grid of the first detector stage. (Place crystal filter in the OUT position in radio receivers BC–312–C only.) Realine the first i. f. transformer as indicated heretofore. Next, aline the first detector transformer. Note any erratic operation after rechecking all adjustments for maximum response. The i. f. amplifier is now alined and should not require more than 150 microvolts to produce a 10-mw output signal with a noise not exceeding 1 mw in either of the Signal Corps receivers mentioned herein.

(3) *Adjustment of c. w. oscillator.*—With the i. f. circuits alined as explained above, the c. w. oscillator should be turned on. The modulation of the signal generator should be turned off only after ascertaining that the frequency of the signal generator corresponds to exact resonance frequency of the i. f. circuits. The additional precaution should be taken that the CW ADJUST control now is placed in the horizontal position. Furthermore, to avoid the possibility of

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

a heterodyne note being produced by beats between the high frequency oscillator and the c. w. oscillator, vary the tuning of the receiver over a wide range. The audio note should not change if the correct adjustment has been made. Vary the trimmer of the c. w. oscillator, which is accessible through a hole in the front panel after the slotted cap is removed, until a heterodyne is obtained between the signal generator and the beat oscillator.

(4) *Alinement of high frequency oscillator.*—With the c. w. oscillator turned off and with modulation applied to the signal generator, a signal should be applied to the grid of the mixer stage. The correct alinement frequency for the receiver and band in question is given in *c* above. With the signal generator accurately adjusted to the correct frequency, and the band change switch on the corresponding band, the trimmer of the variable high frequency oscillator should be adjusted until maximum response is secured in the headphones or output meter. There are two such adjustments of this oscillator that will produce identical peaking in the output circuits; one of these corresponds to the image frequency and the other is the desired frequency (see *c* above). At this time it may be impossible to ascertain whether the high frequency oscillator is above or below the radio frequency unless recourse is had to the frequency meter. It is suggested that this frequency be checked by means of the frequency meter at this time. This should serve also as a double check on the i. f. frequency which should be the difference of the frequency indicated on the SCR-211-A and that indicated on the signal generator. With the above operations completed on each band, the alinement of radio frequency stages should continue.

Caution: The mechanical position of the r. f. oscillator trimmer capacitors is *exceedingly* critical and the slightest change in position materially detunes the r. f. oscillator circuit. In the final adjustment rock the main tuning control back and forth for maximum output. If this test results in good centering of the frequency marking behind the hairline indicator of the receiver, then the trimmer is correctly adjusted. If, however, the maximum output is obtained at a somewhat different frequency than that of the test oscillator repeat the adjustment of the r. f. oscillator adjustment until exact frequency agreement is obtained.

(5) *Alinement of radio frequency stages.*—Remove six flathead screws and shield plate which cover the r. f. amplifier coil trimmers. See *c* above for the correct r. f. alinement points. The high frequency range of the radio receiver BC-312-C and associated circuit constants necessitate the use of a dummy antenna to connect the signal generator

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

to the antenna binding post of the receiver. A capacitor of 50 micromicrofarads or less is suitable. For the radio receiver BC-314-C, a 250-micromicrofarad capacitor is suitable. With all grid caps in place adjust each of the r. f. amplifier coil trimmers to resonance. Rock the tuning control for maximum response and repeat each adjustment until maximum response is obtained.

Caution: When working on the capacitor trimmers for a particular band do not touch the trimmer adjustments of other bands. Proceed with the alinement working toward the first r. f. amplifier grid circuit and recheck the over-all r. f. alinement before completion of each band. Note the signal sensitivity of each band for a constant low level output as indicated by the output meter.

(6) *Alinement of first r. f. amplifier.*—SET the ALIGN INPUT control in the midposition and adjust the band trimmers to give a maximum receiver output. Some slight readjustment of the ALIGN INPUT control for bands A to B of receiver BC-312-C, coupled with a readjustment of the band trimmer capacitors in order to obtain optimum tracking over the entire frequency range of the band may be necessary.

(7) *Check of crystal filter.*—When the r. f. and i. f. circuits are properly alined turn the CRYSTAL PHASING control from the OUT position and adjust for minimum background noise. Set the signal generator to an unmodulated r. f. signal. Turn the main dial sharply back and forth across the band point for which the signal generator is set. Under these conditions a musical "chirp" will be heard in the headphones or speaker. If the chirp is present this indicates that the quartz crystal is being excited by the varying i. f. signal produced by the above tuning operation. The effect will be more pronounced for one direction of rotation of the main tuning dial than the other. After a careful alinement procedure has been completed, a readjustment of the r. f. oscillator trimmer with an r. f. signal from the signal generator introduced at the signal antenna will yield the maximum crystal sensitivity. This adjustment will be *very* critical for each of the six bands and the utmost care must be exercised lest the entire alinement instituted at (4), (5), and (6) above be lost. Do not touch r. f. or i. f. amplifier coil trimmers or main tuning dial during retrimming operations on the r. f. oscillator. During retrimming operations the phasing adjustment accomplished at the first part of this subparagraph should not be disturbed. When retrimming operations are complete set the CRYSTAL

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

PHASING control to the OUT position and check the signal sensitivity noted in *caution* under (5) above. No loss in sensitivity should occur.

(8) *Check of final alinement.*—With the receiver alined as described in preceding subparagraphs, the frequency control dial should be varied throughout the band and the alinement checked at at least three frequencies to ascertain that the optimum results are being secured. If the variable high frequency oscillator is correctly following the tuning of the radio frequency stages and producing a difference frequency equal to that of the i. f., satisfactory performance should be secured. In actual practice, perfect tracking is never obtained. It is essential that the receiver be checked throughout each range and the circuit so compensated that the best available results are obtained. Frequently it will be noted that with receivers which are materially out of alinement the variable frequency oscillator is actually adjusted to the wrong side of the radio frequency stages, in which case tracking with the receiver and preceding stages is not possible. Thus, extreme care must be taken that the initial oscillator alinement frequency is on the correct side of the radio frequency stages in order that tracking may be feasible and correct. The final criterion for the correct alinement of a Signal Corps superheterodyne receiver is the sensitivity and selectivity which are obtainable after completion of all tests. In general, radio receivers of the BC-312-C should be capable of producing a 10-milliwatt output signal with a 4:1 signal to noise ratio with not more than 5 microvolts input at any frequency. Radio receivers of the BC-314-C should be capable of producing a 10-milliwatt output signal with a signal to noise ratio of 4:1 with not more than 10 microvolt input at any frequency.

(9) *Preparation for return to service.*—After each radio receiver has been serviced following the procedure outlined herein, it will be necessary to *lock all* adjusting controls that have provision for so doing and to replace the chassis in the cabinet. All grid caps must be in place and the tubes firmly seated. It is also recommended that each chassis be turned upside down and cleaned with an air blast to remove any metallic particles. The receiver together with its cabinet should then be placed on its flexible mounting in whatever installation is required and connected in the same manner as before taking out of service. A quick check with the normal antenna employed will reveal whether or not the receiver is in first-class operating condition.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

e. Special procedure of alinement of crystal filter.—(1) Under the alinement conditions set forth in *d* above, the receiver sensitivity without the use of the crystal is maximum. Considerably less sensitivity than indicated in *d*(8) above is obtained when the crystal phasing control is set for maximum crystal selectivity. In event that a maximum sensitivity in conjunction with crystal selectivity is required, the following alinement procedure will give maximum sensitivity using maximum crystal selectivity.

(2) Aline the receiver as in *d* above.

(3) Set the crystal phasing control for minimum background noise at the completion of *d*(6) above.

(4) Vary the signal generator frequency above and below 470 kc. by means of fine frequency control so as to bring the signal generator frequency to exact coincidence with the natural crystal frequency.

(5) Readjust the top core trimmer screw located at the top of the first detector output transformer for maximum output.

(6) Repeat the operations in (4) and (5) above.

Caution: Do not change the CRYSTAL PHASING control during the operations indicated in (4) to (6), inclusive, above.

(7) The receiver will now have a considerably higher crystal selectivity and sensitivity and somewhat less sensitivity with the crystal out than is obtained under *d*(6) above.

41. Normal current, resistance, and voltage readings.—The following normal current, resistance, and voltage readings are furnished for the information and guidance of servicing personnel. (The values are approximate and will vary slightly with different sets and different measuring equipment.)

a. Current readings.—(1) The low voltage current consumptions of the receivers and transmitter measured at power input terminals are listed below.

(*a*) *Radio receivers BC-312-C and BC-314-C.*

Receiver	Voltage (volts)	Current (amperes)
BC-312-C	12	4.2
BC-314-C	12	4.2

(*b*) *Radio transmitter BC-191-C.*—The low voltage filament current consumption is based on a filament voltage of 10 volts. With a vacuum tube VT-4-C filament requirement of 3.25 amperes per tube at 10 volts, and a vacuum tube VT-25 (with filament resistors 1152

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 19:59 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

and 1153) with a filament requirement of 1.25 amperes, the following total filament current requirements ensue:

Filament volts	Current amperes	
	C.w.	Tone and voice
10	7. 75	14. 25

(2) The following table gives the typical performance values for a power unit PE-49-C operated at 2614 r. p. m. Any given power unit may deviate somewhat from the performance indicated below. The power and current used by a transmitter operated from the power unit PE-49-C will depend upon the mode of operation and various adjustments possible within a given mode of operation.

Low voltage end		High voltage end	
Volts	Amperes	Volts	Amperes
14. 9	3. 5	990	0
14. 9	3. 5	955	. 330
14. 8	6. 5	1, 000	0
14. 8	6. 5	965	. 335
14. 7	11	1, 020	0
14. 7	11	970	. 34
14. 62	14	1, 020	0
14. 62	14	980	. 34
14. 5	17. 2	1, 030	0
14. 5	17. 2	990	. 35
14. 42	25	1, 040	0
14. 42	25	1, 005	. 35

b. Normal voltage readings for radio receivers BC-312-C and BC-314-C.—The tables of voltages shown below are provided for the information and guidance of servicing personnel. The readings are made at the tube prongs using the set analyzer of test set I-56-A, with an input voltage of 14 volts, the OFF MVC AVC switch in the MVC position, and the VOL control turned to maximum. For the c. w. oscillator readings the CW OSC OFF ON switch is in the ON position. For all other readings this switch is in the OFF position. Adapter FT-211 must be used when the set analyzer of test set I-56-A is employed for measurement on the two r. f. and first detector tubes.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

The plug of the adapter is inserted into the tube socket and its grid stud connected to the receiver grid clip. The socket end of the adapter is connected to the set analyzer plug and the grid clip on the adapter is connected to the stud on the set analyzer plug. Measurements are then made in the regular manner.

(1) *Radio receiver BC–312–C.*

Tube	Voltages (volts)			
	Filament	Cathode to ground	Screen grid to ground	Plate to ground
1st r. f. amplifier (VT–86)	6. 5	3. 5	92	207
2d r. f. amplifier (VT–86)	6. 5	3. 3	82	217
1st detector (VT–87)	6. 5	2. 5	77	217
1st i. f. amplifier (VT–86)	6. 5	3. 6	94	215
2d i. f. amplifier (VT–86)	6. 5	3. 7	97	217
C. w. oscillator (VT–65)	6. 5	--------	--------	100
Triode; 1st audio (VT–88)	6. 5	6. 7	--------	215
2d audio amplifier (VT–66)	6. 5	18. 5	222	212
R. f. oscillator (VT–65) Band A	--------	20	--------	106
R. f. oscillator (VT–65) Band B	--------	15	--------	102
R. f. oscillator (VT–65) Band C	--------	12	--------	104
R. f. oscillator (VT–65) Band D	--------	0	--------	98
R. f. oscillator (VT–65) Band E	--------	0	--------	95
R. f. oscillator (VT–65) Band F	--------	0	--------	97

(2) *Radio receiver BC–314–C.*

Tube	Voltages (volts)			
	Filament	Cathode to ground	Screen grid to ground	Plate to ground
1st r. f. amplifier (VT–86)	7	3. 8	98	235
2d r. f. amplifier (VT–86)	7	3. 6	98	235
1st detector (VT–87)	7	4. 8	128	235
1st i. f. amplifier (VT–86)	7	4. 5	95	235
2d i. f. amplifier (VT–86)	7	4. 2	96	235
C. w. oscillator (VT–65)	7	0	--------	30
Triode; 1st audio (VT–88)	7	8	--------	235
2d audio amplifier (VT–66)	7	21	240	235
R. f. oscillator (VT–65)	7	0	--------	100

Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

c. Normal resistance values for radio transmitter BC-191-C.—(1) *General.*—Normal resistance values obtained by point to ground measurements on radio transmitter BC-191-C in a satisfactory condition are indicated below. Comparison of these data with similar measurements on faulty equipment, combined with a logical circuit analysis, will frequently disclose the source of trouble in inoperative or improperly operating transmitters. These data were taken under the following conditions which must be reproduced in making comparison measurements on a faulty transmitter:

(*a*) All tubes and cords removed from the transmitter.
(*b*) Pilot light LM-27 removed.
(*c*) CW TONE VOICE switch set on VOICE.
(*d*) Tuning unit TU-5-A or TU-6-A inserted.
(*e*) OFF ON switch in the ON position.
(*f*) Fuse FU-12 in the active mounting.

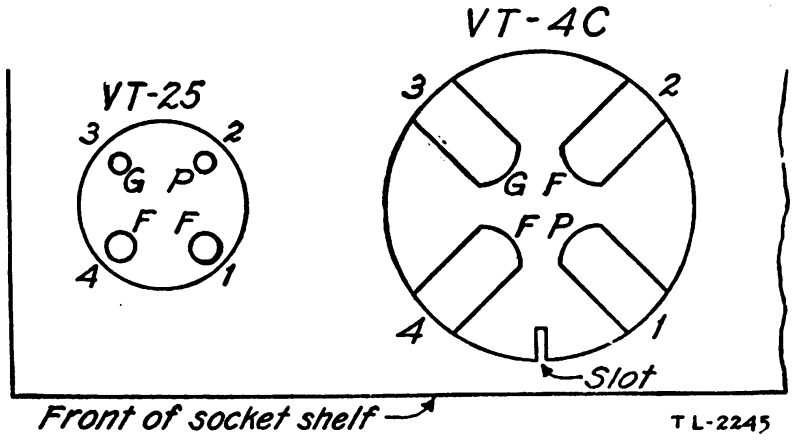


FIGURE 43.—Transmitting vacuum tube socket pin locations.

(2) *Measurements from tube sockets.*—Tube socket connections, from which the measurements shown below are made, are numbered as shown in figure 43.

Stage	Tube	Tube socket pin			
		1	2	3	4
Speech amplifier	VT-25	80 ohms	1 megohm	0.2-0.203 megohm.	1 ohm.
Master oscillator	VT-4C	1 megohm	80 ohms	0.2075 megohm	0 ohm.
Power amplifier	VT-4C	1 megohm	80 ohms	0.21 megohm	0 ohm.
Modulator	VT-4C	1 megohm	80 ohms	0.203-0.206 meg ohm.	0 ohm.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

(3) *Measurements from cord sockets.*—The socket pins from which measurements of resistance to ground are made are identified by number as shown in figure 44. This figure represents the cord con-

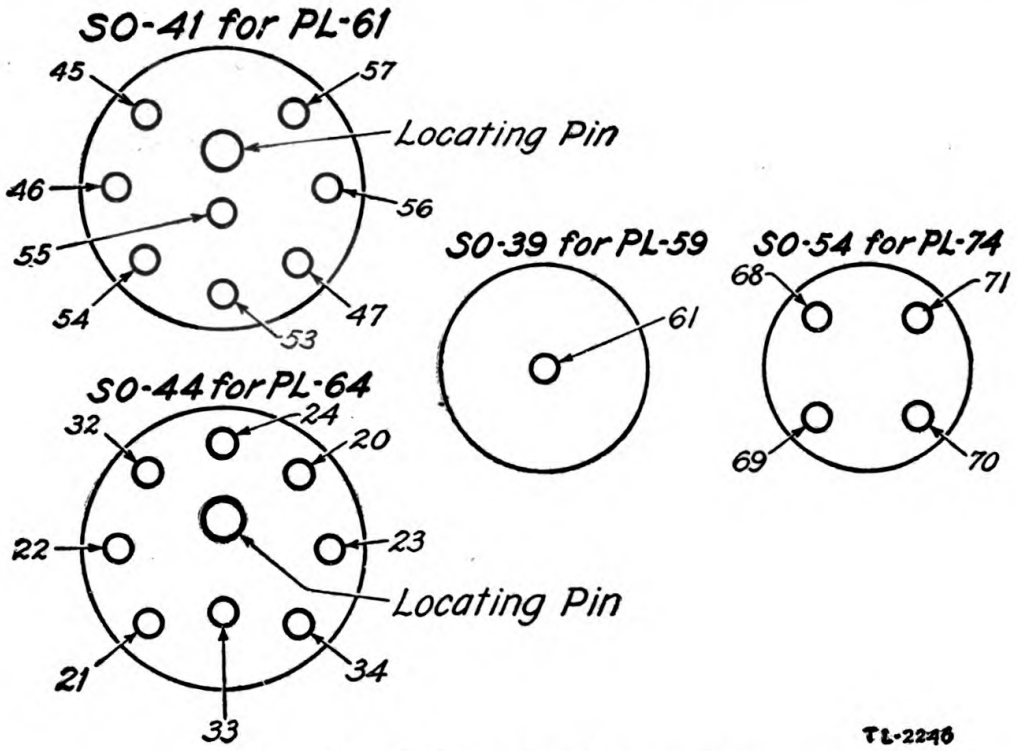


FIGURE 44.—Cording socket pin nomenclature.

necting sockets for radio transmitters BC-191-C as viewed from the outside of the set. Sockets are easily identified by the number and arrangement of the pins therein. Resistance measurements from these socket pins to ground are indicated below.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

SO-44 for PL-64		SO-41 for PL-61		SO-54 for PL-74		SO-39 for PL-59	
Pin No.	Resistance to ground	Pin No.	Resistance to ground	Pin No.	Resistance to ground	Pin No.	Resistance to ground
34	100 ohms	45	85 ohms	68	0 ohm	61	1 megohm.
[1] 23	60–240 ohms	46	85 ohms	69	0 ohm		
20	Open	54	85 ohms	70	120 ohms		
24	0 ohm	47	0 ohm	71	95 ohms		
32	0 ohm	53	0 ohm				
22	Open	56	0 ohm				
21	Open	57	0 ohm				
[2] 33	31 ohms 61 ohms 91 ohms 122 ohms	55	0.210 megohms				

[1] INPUT LEVEL set at 0 gives 240 ohms and set at 10 gives 60 ohms with intermediate values of resistance for other settings of the control.
[2] Side-tone adjustment (stepwise) values, keying relay manually operated.
0—Zero resistance.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

(4) From figure 45 a number of circuit elements of radio transmitter BC–191–C may be identified and checked for continuity.

42. Procedure in case of set failure.—*a.* ***Caution:*** Do not change fuses or make repairs with the high voltage on. Failure of this radio equipment to operate properly is usually due to worn, broken, or disconnected cords, plugs or sockets, run-down storage

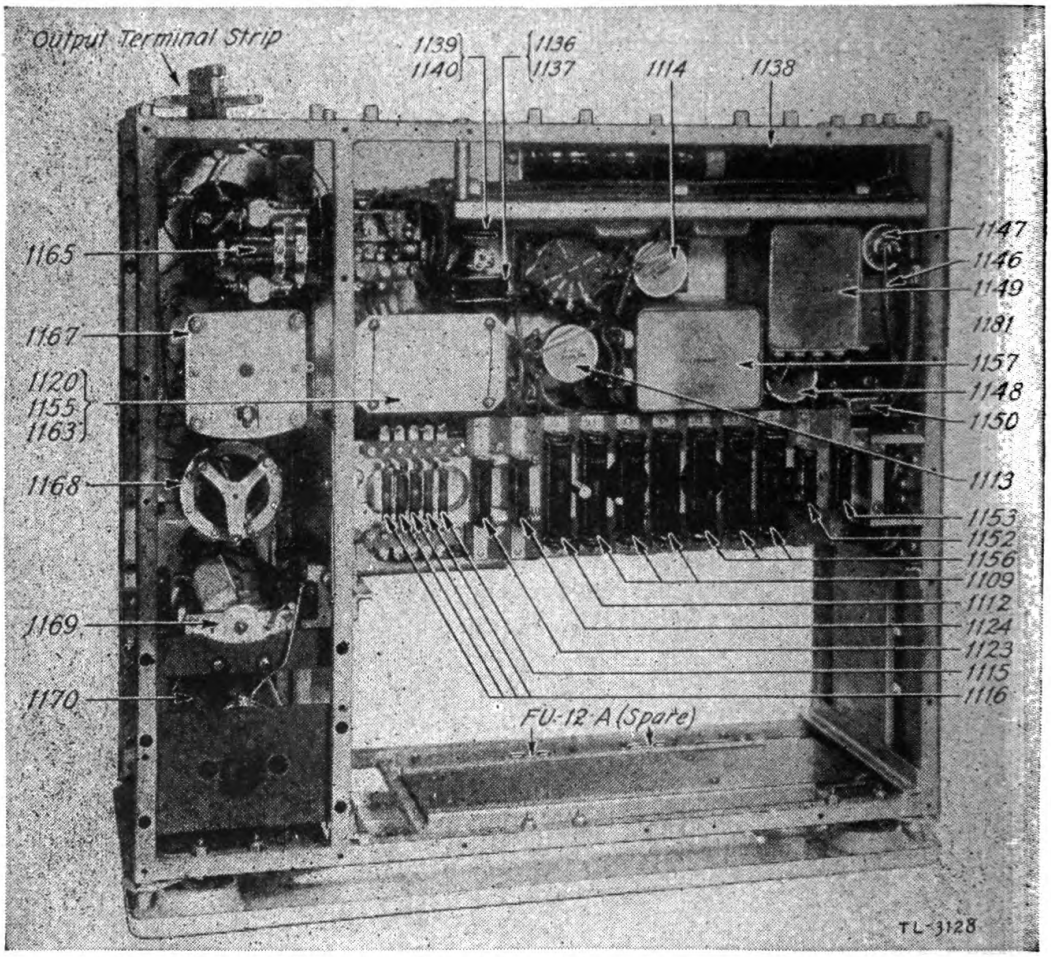


FIGURE 45.—Radio transmitter BC–191–C, rear view, shields removed.

battery, worn dynamotor brushes, defective fuses, defective tubes, or improper operation of the power unit, and these items should be checked before initiating a detailed check of component parts. If failure of both receivers occurs simultaneously, the trouble is usually in the primary power source or leads connected thereto. If only one component fails to operate, determine, if feasible, if it is receiving proper supply voltages. This usually determines whether the trouble is inside or outside of the component. Check fuses in the equipment at an early stage in "trouble shooting." Do not continue to burn out

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

fuses before looking elsewhere to determine the basic source of trouble.

b. When exposed to conditions of excessive humidity, failure to operate properly may occur as the result of moisture accumulations across insulators or insulating structures. Every precaution should be taken to keep these installations moisture free. ***Caution:*** Many of the unit parts used in these transmitters and receivers are readily damaged by excessive or abrupt applications of heat. A free flow of warm air through a chassis will accomplish the desired drying in less time than the application of very warm air without a free flow through and subsequently out of a chassis.

43. Locating trouble.—The following causes of set trouble may be present.

a. Radio receivers BC-312-C and BC-314-C.

Symptom	Cause
(1) No filament voltage	Poor battery. Open power lead. Short-circuited power lead. Poor plug contact. Burned-out fuse. Burned-out tube filament. Damaged bypass capacitor. Loose connection inside of the receiver.

The first five of the above causes should be checked before removing the receiver chassis from its cabinet.

Symptom	Cause
(2) No plate voltage	Poor battery. Open or short-circuited cord. Poor plug contact. Burned-out fuse. Defective dynamotor. Defective filter.[1] Loose connection inside the receiver. Short-circuited bypass capacitor. Open resistor.

[1] *To check,* remove the brush lead from terminal 2 of dynamotor terminal strip (see fig. 38) and check the actual brush voltage. If normal (or high) voltage is read, connect the brush lead to the lead *removed* from the terminal B+. If receiver operates, the filter is damaged.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

The first four of the above causes should be checked before removing the receiver chassis from its cabinet.

Symptom	Cause
(3) No audio frequency output	Headset plug not completely inserted in jack. Defective headset, headset plug, or headset cord. Defective tube.[2] Loose connections inside the receiver. Damaged capacitor. Damaged resistor. Defective jack insulation. Breakdown on r. f. coils, leads, or switches. Defective band-change switch.

[2] Tubes used in these receivers should be checked with the tube checkers of test set I-56-A at least once a year. If found serviceable, they should be replaced in the identical socket of the same receiver from which they were removed.

The first two causes should be checked before removing the receiver chassis from its cabinet. The last two causes will be indicated by lack of signal audio output, although some *audio noise* output is present.

Symptom	Cause
(4) No change in intensity of noise level when SEND REC switch is on SEND position and the transmitter is being keyed.	Antenna relay inoperative.
(5) Erratic noise in receiver	Defective headset or headset cord. Defective dynamotor. Antenna relay chattering. Dust or dirt in the receiver. A loose connection in the receiver. Defective tube. Defective capacitor or resistor in receiver.

The first possible cause of trouble should be checked before removing the receiver chassis from its cabinet.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:00 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Symptom	Cause
(6) A. c. ripple in output	Defective filter choke. Defective filter capacitor. Defective dynamotor. Defective grounding.
(7) PE-49-C noise	Defective chassis grounding.
(8) Frequency calibration off	Improper alinement.[3]
(9) Lack of sensitivity	Improper alinement.[3] Worn out tubes.

[3] See paragraph 40.

b. Radio transmitter BC-191-C.

Symptom	Cause
(1) No filament voltage	Open power lead. Short-circuited power lead. Defective TONE CW VOICE switch. Poor plug contact. Burned-out fuse. Damaged bypass capacitor. Loose connection inside the transmitter. Open interlock.
(2) No plate current	Open or short-circuited cord. Poor plug contact. Burned-out fuse. Defective power unit. Loose connection inside the transmitter. Short-circuited bypass capacitor. Open resistor. Damaged choke coil.
(3) No r. f. output	Damaged master oscillator or power amplifier tubes. Damaged choke coil. Damaged coupling capacitor. No plate voltage. Excessive bias voltage, open grid. Output terminal strip not properly connected.[1] Damaged antenna ammeter. Inoperative antenna switching relay and contacts. Defective TONE CW VOICE switch. Defective insulators; dirty or corroded contacts at the antenna connection points.

[1] The pin jacks and plugs used in the connections between the output terminal strip and output plugboard are readily damaged by improper handling. In all cases where r. f. output failure occurs and other checks fail to disclose a fault, an examination of the character of contact made by the pairs of pin jacks and plugs is warranted.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

NOTE.—No r. f. output type of trouble is very erratic. Shows up in the field and may or may not show up at the service bench, using a dummy antenna. Sometimes arcing may be heard. Sometimes a continuity test between antennas and counterpoise will disclose an open circuit (use position 3 or 4 of ANT CIRCUIT SWITCH). Sometimes an examination of the output terminal strip plugs will show discoloration caused by arcing. Dirty or gritty plugs often present enough resistance in the full antenna circuit so that no r. f. output can be obtained. There are pin jacks and plugs in the assembly of the transmitter tuning unit and radio transmitter and similar trouble may occur.

Correction can usually be made by increasing the set of the four springs assembled around the plug body. ***Caution:*** Excessive force applied to the springs will strip them from their base termination and then no field repair is possible. Use only enough force to provide contact pressure with the associated pin jack.

Symptom	Cause
(4) No voice modulation	Damaged speech amplifier or modulator tubes. Improper modulator bias. Defective speech amplifier bias. Microphone plug not properly in jack. Bad plug contacts. Defective microphone. Defective microphone cord. Defective microphone filter circuit. Damaged transformers. Open resistor.
(5) No tone modulation	Damaged speech amplifier or modulator tubes. Improper modulator bias. Defective speech amplifier bias. Defective TONE CW VOICE switch. Damaged resonating capacitors. Defective transformers. Open resistor.

NOTE.—The bias voltages for the modulator tubes and the speech amplifier tube are derived from the grid resistor system of the power amplifier tube and anything which will affect the proper operation of the power amplifier tube grid bias will affect the biasing of the audio frequency stages.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

c. Generator.

Symptom	Cause
(1) No output high voltage side (socket SO-39.)	Blown fuse FU-12. Switching relay not closing. (Relay coil may be open.) Defective contacts in socket. Broken brushes. Open circuit in high voltage brush terminal connecting leads. Punctured filter capacitor.
(2) No output low voltage side (socket SO-41).	Blown fuse FU-13. Switching relay not closing. (Relay coil may be open.) Defective contacts in socket. Dirty commutator. Open circuit in low voltage brush terminal connecting leads.
(3) No output low voltage side (battery charging terminals).	Reverse current cut-out not closing. (Shunt coil may have open circuit. Spring tension may be too great.) Loose wire in battery charging circuit. Defective ammeter. Open circuit in charging rheostat or charging resistor.
(4) No output either high or low voltage side.	Blown fuse FU-13. Broken low voltage brushes. Dirty commutators. Open circuit in low voltage brush terminal connecting leads. Defective voltage regulator. (Dirty regulator contacts.) Open circuit in field coils or connections. (Check field switch.) Armature windings short-circuited or grounded internally. Punctured filter capacitors.
(5) Low output voltage either high or low voltage side.	Dirty commutators. Defective voltage regulators. (Dirty regulator contacts.) Poor fuse contact. Field coils partly short-circuited Low engine speed.
(6) Sparking at commutators	Broken or improperly fitted brushes. Open circuit in armature windings. Dirty commutators. Punctured filter capacitors.
(7) Excessive sparking at voltage regulator contacts.	Dirty or loose contacts. Open circuit in regulator resistor or regulator secondary winding.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

d. Engine.

Symptom	Cause
(1) Engine hard to start	No gasoline in tank. Spark plug fouled. Spark plug cracked. Fuel line obstructed. Water in fuel supply. Loose or defective ignition wiring. Improper gas mixture. Throttle valve stuck. Throttle rod loose or out of adjustment. Intake manifold leaking. Valve seats bad. Valve sticking. Improper timing. Defective magneto. (*a*) Breaker points worn or pitted. (*b*) Breaker points out of adjustment. (*c*) Breaker cam out of time. (*d*) Stop switch wire short-circuited. (*e*) High voltage wire grounded.
(2) Engine misfiring	Spark plug fouled. Spark plug cracked. Spark plug gap incorrect. Loose spark plug connection. Defective ignition wiring. Ignition breaker points sticking. Cylinder head gasket leaking. Manifold gasket leaking. Valves warped or broken. Valves or tappets sticking. Tappets improperly adjusted.
(3) Engine overheating	Carburetor choke valve partly closed. Improper gas mixture. Valves leaking. Oil badly diluted. Lack of oil.
(4) Engine lacks power	Valve seats worn. Piston rings weak or torn. Piston rings sticking. Improper gas mixture. Improper timing. Muffler stopped up. Governor or throttle loose. Oil badly diluted. Air cleaner needs cleaning.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Symptom	Cause
(5) Engine knocks	Carbon in cylinder.
	Loose main bearing.
	Loose connecting rod bearing.
	Worn piston and cylinder.
	Loose tappets.
	Motor overheated.
	Tight piston.
	Loose flywheel.
	Lack of oil.
(6) Excessive smoke from exhaust	Too much oil in crankcase.
	Carburetor needle valve open too far.
	Carburetor float sticking or leaking.
	Worn piston or rings.
(7) Explosion in carburetor or intake manifold.	Gas mixture too lean.
	Intake valve sticking.
	Intake tappet sticking.
	Intake valve spring weak.
	Intake manifold leaking.
	Intake valve warped or broken.
	Intake tappet set too close.
	Cylinder head gasket leaking.
(8) Poor compression	Valves not seating.
	Valves sticking.
	Tappets sticking.
	Tappets set too close.
	Piston rings worn or weak.
	Piston rings broken.
	Piston rings sticking.
	Loose spark plug.
	Cylinder head loose.
	Cylinder head gasket leaking.
	Scored cylinder.
	Worn piston and cylinder.
	Cracked spark plug.

44. Repairs.—Repairs other than the following will not be attempted by using personnel unless specifically authorized under the provision of appendix C, Signal Corps General Catalog (see par. 40*a*(1)).

a. Cords.—Cords may become defective because of an open circuit in one or more conductors, a short circuit between two or more conductors, or between any conductor and ground. These defects most frequently occur at the point of attachment of the cord to its corresponding plug. These points should be examined and where possible necessary repairs made. In the event that the damage occurs any

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

great distance from either end of the cord, it is normally impossible to make a serviceable permanent repair of the cord. A new cord should be obtained and installed. However, in an emergency the defective portion of the cord may be cut out and jumpers used to restore the necessary circuits until a new cord can be obtained.

b. Headsets.—The failure of a headset to operate properly is usually due to a defective cord or plug which may be reparable. However, if the damage is within the phones, a new headset should be secured and the defective unit shipped to the proper agency for repair.

c. Dynamotor DM-21-A.—Normally if these dynamotors have become defective, they should be removed and replaced. Replacements are obtained through the usual channels. The replacement of brushes, turning down of commutators, freeing of bearings, and all repairing of defective receiver dynamotors is done at Signal Corps repair shops or Signal Corps radio sections at air depots. In event the dynamotor cannot be replaced or where an emergency requires it, local repairs are allowable. Where local repairs are made, careful sanding-in of new brushes to fit the commutator, proper spring adjustment, and a running-in period are necessary to insure quiet receiver operation. If results following local replacement of brushes are unsatisfactory, the dynamotor should be returned to a depot for overhaul when it can best be spared. Commutators not unduly worn may be cleaned by wiping off thoroughly with carbon tetrachloride or by using a fine grade of sandpaper and wiping thoroughly. If the bearings are not damaged but merely need freeing, a drop of light oil is added to each. If the trouble is due to an open or short-circuited winding, grooved commutators, or some other serious defect, the dynamotor should be replaced.

SECTION V

LIST OF PARTS

45. Components of radio set SCR-177-B.—Dimensions and weights, where unappreciable, are omitted.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Quantity	Stock No.	Article	Dimensions (inches)[1]			Unit weight (pounds)
			Height	Width	Depth	
6	2A221A	Antenna AN-21-A	100 feet long			1. 69
5	2A222A	Antenna AN-22-A	20 feet long			. 56
1	2A223A	Antenna AN-23-A	35 feet long			. 75
1	2A225	Antenna AN-25	5 feet long			. 44
2	2A226	Antenna AN-26	25 feet long			. 69
1	2A227	Antenna AN-27	10 feet long			. 50
1	2C516A	Antenna tuning unit BC-306-A; includes mounting FT-142.	17¾	9½	9⅛	9. 10
2	3B46	Battery BB-46; includes 1 spare	14⅝	15⅛	6½	97. 0
2	3H4549C/1	Book, instruction, for power unit PE-49-C[2]				. 3
2	2C4312C/B5	Book, instruction, for radio receiver BC-312-C and BC-342-C.[2]				. 3
2	2C4314C/B5	Book, instruction, for radio receiver BC-314-C				. 3
2	2D8177B	Book, instruction, for radio set SCR-177-B				. 2
2	2C6191C/1	Book, instruction, for radio transmitter BC-191-C[2]				1. 1
4	2A347	Block FT-127; spare				. 16
1	2Z1108	Box BX-8	9⅞	8⅜	7⅞	6. 00
2	2687	Brush, H. V. for dynamotor DM-21-B; spare				
2	2686	Brush, L. V. for dynamotor DM-21-B; spare				
2	2Z1848	Case CS-48	7⅞	16¾	8	8. 00
1	2Z2527A	Chest CH-27-A	29½	42⅜	16¼	59. 0
1	2Z2530	Chest CH-30	16	46	12	60. 0
1	2Z2532A	Chest CH-32-A	19	30	11½	30. 0
1	2Z2549	Chest CH-49	18	41¼	11⅞	60. 0
3	2Z3000	Connector BL-5; includes 1 spare				. 8
3	3E1133A	Cord CD-133-A	16 inches long			. 09
3	3E1138	Cord CD-138	100 feet long			12. 00

See footnotes at end of table.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Quantity	Stock No.	Article	Dimensions (inches)			Unit weight (pounds)
			Height	Width	Depth	
1	3E1148	Cord CD–148	50 feet long			6. 75
1	3E1149	Cord CD–149	50 feet long			6. 0
1	3E1176A	Cord CD–176–A	72 inches long			5. 00
1	3E1264	Cord CD–264	30 inches long			. 25
1	3E1265	Cord CD–265	27 inches long			. 25
6	2Z4309	Fastener FT–9; includes 3 spares				. 07
6	2A1128	Fitting FT–128; spare				. 1
6	3Z1912A	Fuse FU–12–A (or FU–12); spare				. 04
8	3Z1921A	Fuse FU–21–A; spare				. 04
8	2A1321A	Guy GY–21–A				. 31
4	2A1322A	Guy GY–22–A				2. 72
4	2A1323A	Guy GY–23–A				2. 09
2	2A1324A	Guy GY–24–A				1. 59
4	2A1330	Guy GY–30				2. 09
2	6Q49001	Hammer HM–1				2. 20
3	2B918	Headset P–18; includes 1 spare				1. 13
20	3G586	Insulator IN–86; includes 8 spares				. 19
1	2Z5682	Junction box TM–190; includes 1 Cord CD–340. 1 Cord CD–341.				2. 75
1	3Z3447	Key J–47				. 50
5	2Z5927	Lamp LM–27; spare				. 03
8	2Z6110	Leg LG–10	31¼ inches long.	3–inch diameter.		2. 20
26	2A2344	Mast section MS–44; includes 2 spares	66 inches long			4. 18
6	2A2079	Mast base MP–19; includes 2 spares				1. 15

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

2	2B1617	Microphone T-17; includes 1 spare				.75
1	3H4549C	Power unit PE-49-C [2]; includes 1 Filter FL-9. 2 Fuse FU-12 (1 mounted spare). 2 Fuse FU-13 (1 mounted spare). 6 Fuse link M-141, spare. 1 Tool kit. 1 Package spare parts.	22	35	22	260.00
1	2C4312C	Radio receiver BC-312-C [2]; includes 1 Dynamotor DM-21-B. 3 Fuse FU-21-A (10-ampere) (1 mounted spare). 2 Lamp LM-27. 1 Mounting FT-162.	10¾	18 1/16	9	47.5
1	2C4314C	Radio receiver BC-314-C; includes 1 Dynamotor DM-21-B. 3 Fuse FU-21-A (10-ampere) (1 mounted spare). 2 Lamp LM-27. 1 Mounting FT-162.	10¾	18 1/16	9	47.5
1	2C6191C	Radio transmitter BC-191-C [2]; includes 3 Fuse FU-12-A (mounted spare). 1 Lamp LM-27. 1 Mounting FT-151-A. 1 Socket cap M-163-A. 1 Socket cap M-164-A. 2 Socket cap M-165-A. 2 Wrench (set screw).	21¾	23⅛	9⅜	55.0
8	2A3103	Reel RL-3				1.0
100 feet	6Z7925	Rope RP-3; spare				1.2
6	2A3212	Snap FT-126; spare				.06
1	2Z8795A	Socket cap M-163-A				.04
1	2Z8793A	Socket cap M-165-A				.04

See footnotes at end of table.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Quantity	Stock No.	Article	Dimensions (inches)			Unit weight (pounds)
			Height	Width	Depth	
30	2A3302	Stake GP–2; includes 2 spares	16 inches long			1. 25
6	2A3308	Stake GP–8; includes 3 spares	18 inches long			1. 00
6	2Z9018	Strap ST–18; includes 2 spares	44 inches long			. 40
1	2C8003A	Transmitter tuning unit TU–3–A (400–800 kc.)	7⅞	16¾	8¾	13. 20
1	2C8005A	Transmitter tuning unit TU–5–A (1,500–3,000 kc.)	7⅞	16¾	8¾	14. 40
1	2C8006A	Transmitter tuning unit TU–6–A (3,000–4,500 kc.)	7⅞	16¾	8¾	12. 40
8	2T4C	Tube VT–4–C; includes 4 spares				. 47
2	2T25	Tube VT–25; includes 1 spare				. 37
8	2T65	Tube VT–65; includes 4 spares				. 10
4	2T66	Tube VT–66; includes 2 spares				. 10
16	2T86	Tube VT–86; includes 8 spares				. 10
4	2T87	Tube VT–87; includes 2 spares				. 10
4	2T88	Tube VT–88; includes 2 spares				. 10
100 feet	1B29	Wire W–29				1. 4
2 feet	1B125	Wire W–125				. 32
15 feet	1B128	Wire W–128				1. 5

[1] Dimensions in inches except where shown otherwise.

[2] Power unit PE–49–A or PE–49–B may be substituted for power unit PE–49–C. If such substitution is made, a separate filter FL–9 should be used. Radio transmitter BC–191–A or BC–191–B may be substituted for radio transmitter BC–191–C. Either radio receiver BC–312–A or BC–312 may be substituted for BC–312–C, provided that adapter FT–197 is furnished for attaching an unshielded antenna. In all cases the "Book, instruction for ———" should agree with the equipment furnished.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

46. Radio transmitter BC–191–C.

Reference No.	Stock No.	Name of part	Description	Function
------	2C6191C	Radio transmitter BC–191–C.	75 w	
1101	2C6191/S2	Socket	For VT–4–C	For m. o. tube.
1102	3Z9622	Switch, interlock	Pushbutton, nonlocking	High voltage protection.
1103	------	Capacitor	Thermal compensator	Thermal compensation of m. o. tank.
1104	------	---do---	Part of 1103	Calibration reset.
1105	3DA6–4	---do---	0.006 μf, 2,500 v	M. o. plate bypass.
1106	2C6191A/D1	Choke	Fixed r. f	M. o. plate.
1107	3DA20–6	Capacitor	0.02 μf, 1,000 v	Filament bypass.
1108	3D9100–12	---do---	0.0001 μf, 1,000 v	M. o. grid bypass.
1109	3Z6250	Resistor	2,500 ohms, 15 w	M. o. grid bias.
1110	2C6191/S2	Socket	For VT–4–C	For p. a. tube.
1111	3D9100–12	Capacitor	0.0001 μf, 1,000 v	P. a. grid bypass.
1112	3Z6400–1	Resistor	4,000 ohms, 15 w	Part of p. a. grid bias.
1113	2C6191A/R31	---do---	3,000 ohms	Mod. bias control.
1114	2C6191A/R31	---do---	3,000 ohms	S. a. bias control.
1115	3Z6720	---do---	200,000 ohms, 1 w	Part of keying circuit.
1116	3Z6725	---do---	250,000 ohms, 1 w	High voltage bridge.
1117	3DA1–9	Capacitor	0.001 μf, 4,500 v	P. a. plate power bypass.
1118	2C6191A/D1	Choke coil	Fixed r. f	P. a. plate.
1119	2C6191A/D2	---do---	Fixed r. f	Negative high voltage return.
1120	2C6191A/C5	Capacitor	1 μf, 1,200 v. d. c	R. f. bypass high voltage supply.
1121	3F222.1	Ammeter IS–22	500 m. a., d. c., blocked in red from 210 to 220 m. a.	TOTAL PLATE CURRENT meter.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function
1122	2Z5927	Lamp LM-27		Pilot lamp.
1123	3Z6003-3	Resistor	30 ohms, 5 w	Series with 6.3 v lamp.
1124	3Z6003-3	----do----	30 ohms, 5 w	Series with pilot lamp in control box BC-309.
1125	2Z8754	Socket SO-54	Alternate connection 1173 for plug PL-74.	Cording.
1126	2Z8741	Socket SO-41	Alternate connection 1174 for plug PL-61.	Do.
1127	2Z8739	Socket SO-39	Alternate connection 1175 for plug PL-59.	Do.
1128	2Z8744	Socket SO-44	Alternate connection 1176 for plug PL-64.	Do.
1129	2Z5533A	Jack JK-33-A		Microphone.
1130	2Z5534A	Jack JK-34-A		Key.
1131	3Z9622	Switch	Pushbutton, nonlocking	Test key.
1132	3Z9623	Switch OFF ON	Two position, rotation	Filament and dynamotor circuits.
1133	3F7322	Voltmeter IS-122	15 v a. c., d. c., *red line* at 10 v	Filament voltages.
1134	3DA10-17	Capacitor	0.01 μf, 1,000 v	R. f. bypass on voltmeter.
1135	3Z8106	Switch SW-106	Single pole double throw	C. w. filament or mod. filament voltage.
1136	3Z9624	Switch AC DC	Ganged with 1137	A. c. or d. c. operation of filaments.
1137	3Z9624	----Do----	Ganged with 1136	A. c. or d. c. operation of filaments.
1138	2C6191A/R5	Resistor	1.2 ohms blue stick resistor mounted to tapped connection board.	Filament voltage adjustment.
1139	3Z9624	Switch 12 v 14.2 v	Ganged to 1140	For 12 v or 14.2 v battery voltage.
1140	3Z9624	Switch 12 v 14.2 v	Ganged to 1139	For 12 v or 14.2 v battery voltage.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

1141	3Z9625	Switch selector TONE CW VOICE.	Three position	Select tone, c. w. or voice operation.
1142	3DA1–10	Capacitor	0.001 μf, 2,500 v	Oscillator feed back on tone or c. w.
1144	3DB1.1A	do	1 μf, 300 v	Speech amplifier grid bypass.
1145	3Z6005–2	Resistor	50 ohms, 5 w	Microphone circuit.
1146	2C6191A/K1	Reactor	Iron cored	Microphone filter item.
1147	2C6191A/C9	Capacitor	25 μf, 25 v	Microphone filter item.
1148	2C6191A/R32	Resistor	200 ohms, variable, no taper	S. a. input level control.
1149	2C6191A/T3	Transformer	Microphone	Input to s. a.
1150	3DA1–7	Capacitor	0.001 μf, 2,500 v	Resonating capacity on tone or c. w. operation.
1151	3Z6020–4	Resistor	200 ohms, 3 w	Grid bias stabilization.
1152	3Z5991–2	do	1 ohm, 5 w	Filament s. a. tube.
1153	3Z5991–2	do	1 ohm, 5 w	Filament s. a. tube.
1154	2Z8759	Socket	For VT–25	For s. a. tube.
1155	2C6191A/C5	Capacitor	1 μf, 1,200 v d. c	S. a. plate bypass.
1156	3Z6611–1	Resistor	11,000 ohms, 15 w	S. a. plate, voltage reducing.
1157	2C6191A/T2	Transformer	Interstage	S. a. to mod. grids.
1160	3DB1.1A	Capacitor	1μf, 300 v d. c	Mod. grid bypass.
1161	2C6191/S2	Socket	For VT–4–A	Modulator tube.
1162	2C6191/S2	do	For VT–4–A	Modulator tube.
1163	2C6191A/C5	Capacitor	1 μf, 1,200, v d. c	Mod. plate power bypass.
1164	2C6191A/T1	Transformer	Modulation	Mod. tubes to p. a.
1165	2C6191A/L1	Relay	Antenna switching	Antenna switching and transmitter keying.
1166	3F289	Ammeter IS–89	8 amp. r. f., with internal thermocouple.	
1167	2C6191C/D3	Coil	Rotating continuously variable	ANT IND TUNING.
1168	3Z9626	Switch	Four position	ANT CIRCUIT SWITCH.
1169		Capacitor	22 to 118 μμf	Antenna tuning.
1170		Inductor	Tapped inductor	Antenna loading.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function
1171	3Z9627	Switch	Five position	ANT IND SWITCH.
1172	3Z1912	Fuse FU–12–A	0.5 amp., 1,000 v	High voltage supply.
1173	2Z8754	Socket SO–54	For plug PL–74	Cording.
1174	2Z8741	Socket SO–41	For plug PL–61	Do.
1175	2Z8739	Socket SO–39	For plug PL–59	Do.
1176	2Z8744	Socket SO–44	For plug PL–64	Do.
1177	2Z5533A	Jack JK–33–A		Microphone.
1178	2Z5534A	Jack JK–34–A		Key.
1179	3Z9610A	Switch	Single section, one circuit, four point, nonshorting.	SIDE TONE adjustment.
1180	3DA10–13	Capacitor	0.01 μf, 2,500 v	Plate resonating capacitor, tone, and c. w.
1181	3Z6630–4	Resistor	30,000 ohms, 1 w	Mod. grid stabilization.
1182	3Z6005–2	----do	50 ohms, 5 w	Microphone circuit.
1183	3Z6010–6	----do	Parallel with 1184	Parasitic resistor.
1184	3Z6010–6	Choke	R. f. parallel with 1183	Parasitic choke.
1185	3DB1.1A	Capacitor	1 μf, 300 v d. c	Keying filter.
1186	3Z5995	Resistor	5 ohms, 3 w	Do.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

a. Transmitter tuning unit TU-3-A.

Reference No.	Stock No.	Name of part	Description	Function
----	2C8003A	Transmitter tuning unit TU-3-A.		
301		Inductor	Variometer	M. o. tank.
302		Choke		M. o. plate.
303		do	With resistor 317	M. o. grid.
304		Capacitor	0.002 μf, 5,000 v	Do.
305	2C8003A/C1	do	Parallel to 308	Thermal compensator.
306		Choke		P. a. grid.
307	3Z9615	Switch	Three position	M. o. tank, band change.
308		Capacitor	0.0001 μf, 3,000 v	M. o. tank.
309		do	0.0002 μf, 3,000 v	Do.
310		do	0.003 μf, 5,000 v	Do.
311		do	0.003 μf, 5,000 v	Do.
312		do	0.005 μf, 5,000 v	Do.
313		do	0.002 μf, 5,000 v	Do.
314		do	0.002 μf, 5,000 v	Do.
315		do	0.005 μf, 5,000 v	Do.
316		do	20 μμf, variable	Neutralizing.
317	3Z6001E5	Resistor	15 ohms, 4.50w, with 303	M. o. grid, parasitic.
318		Capacitor	0.002 μf, 5,000 v	P. a. grid.
319	2C8003A/C2	do	Parallel to 309	Thermal compensation.
320	2C8003A/C3	do	Parallel to m. o. tank chain	Do.
321		Inductor	Variometer	P. a. tank.
322		Switch	Three position, ganged with 307	P. a. tank, band change.
323		Capacitor	0.0001 μf, 3,000 v	P. a. tank.
324		do	0.0002 μf, 3,000 v	Do.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function
325		Capacitor	0.001 μf, 3,000 v	P. a. tank.
326		do	0.001 μf, 3,000 v	Do.
327		Inductor	Tapped	Antenna coupling.
328	3Z9605A	Switch	Six position	Do.
329		Capacitor	0.002 μf, 5,000 v	Do.

b. Transmitter tuning unit TU–5–A.

Reference No.	Stock No.	Name of part	Description	Function
------	2C8005A	Transmitter tuning unit TU–5–A.		
501		Inductor	R. f. fixed	M. o. tank.
502	3Z9614	Switch	Ganged with 522, four position	BAND CHANGE SWITCH.
503	3D9100–11	Capacitor	0.0001 μf, 3,000 v	M. o. tank, band change.
504	3D9100–11	do	0.0001 μf, 3,000 v	Do.
505	3D9100–11	do	0.0001 μf, 3,000 v	Do.
506	3D9030–1	do	0.00003 μf, 2,000 v	M. o. tank.
507		do	20 to 135 μμf	M. o. tank, variable.
508	2C8005A/D10	Choke	With resistor 517	P. a. grid circuit.
509	3D9400–6	Capacitor	0.0004 μf, 5,000 v	P. a. grid blocking.
510	3D9400–6	do	0.0004 μf, 5,000 v	Do.
511	2C8005A/D11	Choke	R. f. fixed	M. o. grid.
512		Capacitor	8 to 26 μμf	Neutralizing.
513		do	Parallel to 503	Thermal compensator.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

514		do	Parallel to 504	Do.
515		do	Parallel to 505	Do.
516		do	Parallel to 506	Do.
517	3Z6001E5	Resistor	15 ohms, 4.5 w, with 508	P. a. grid parasitic.
521		Inductor	R. f. fixed	P. a. tank.
522	3Z9614	Switch	With 502 four position	BAND CHANGE SWITCH.
523	3D9090	Capacitor	0.00009μf, 3,000 v	P. a. tank, band change.
524	3D9090	do	0.00009μf, 3,000 v	Do.
525	3D9090	do	0.00009 μf, 3,000 v	Do.
527		do	20 to 156 $\mu\mu$f	P. a. tank, variable.
528		Inductor	Tapped	Antenna coupling.
529	3Z9605A	Switch	Six position	ANT COUPLING SWITCH.

Generated on 2015-09-24 20:07 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:04 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

c. Transmitter tuning unit TU-6-A.

Reference No.	Stock No.	Name of part	Description	Function
------	2C8006A--------	Transmitter tuning unit TU-6-A.	----------	
601	----------	Inductor----------	R. f. fixed----------	M. o. tank.
602	3Z9612A--------	Switch----------	Two position, ganged with 622----	M. o. tank, band change.
603	3D9050-3--------	Capacitor----------	0.00005 μf, 3,000 v----------	Do.
607	----------	-----do----------	15 to 77 μμf, variable----------	M. o. tank.
608	3C8006A/D14----	Choke----------	With resistor 614----------	P. a. grid.
609	3D9400-6--------	Capacitor----------	0.0004 μf, 5,000 v----------	P. a. grid blocking.
610	3D9400-6--------	-----do----------	-----do----------	M. o. grid blocking.
611	C28006A/D15----	Choke----------	R. f. fixed----------	M. o. grid.
612	----------	Capacitor----------	8 to 26 μμf----------	Neutralizing.
613	----------	-----do----------	Parallel to 603----------	Thermal compensation.
614	3Z6001E5--------	-----do----------	15 ohms, 4.5 w----------	Parasitic p. a. grid.
621	----------	Inductor----------	R. f. fixed----------	P. a. tank.
622	3Z9612A--------	Switch----------	Two position, ganged with 602----	P. a. tank, band change.
623	3D9050-1--------	Capacitor----------	0.00005 μf, 3,000 v----------	Do.
627	----------	-----do----------	19 to 116 μμf, variable----------	P. a. tank.
628	----------	Inductor----------	Tapped----------	Antenna coupling.
629	3Z9605A--------	Switch----------	Six position----------	ANT COUPLING SWITCH.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:04 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
C_1	3D289	Capacitor CA-289	Variable air; 3–25 μμf	Band A trimmer 1st r. f	SC-A-1728
C_2	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band B trimmer 1st r. f	SC-A-1728
C_3	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band C trimmer 1st r. f	SC-A-1728
C_4	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band D trimmer 1st r. f	SC-A-1728
C_5	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band E trimmer 1st r. f	SC-A-1728
C_6	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band F trimmer 1st r. f	SC-A-1728
C_7	3D289	Capacitor CA-289	Variable air; 3–25 μμf	Band A trimmer 2d r. f	SC-A-1728
C_8	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band B trimmer 2d r. f	SC-A-1728
C_9	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band C trimmer 2d r. f	SC-A-1728
C_{10}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band D trimmer 2d r. f	SC-A-1728
C_{11}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band E trimmer 2d r. f	SC-A-1728
C_{12}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band F trimmer 2d r. f	SC-A-1728
C_{13}	3D289	Capacitor CA-289	Variable air; 3–25 μμf	Band A trimmer 1st det	SC-A-1728
C_{14}	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band B trimmer 1st det	SC-A-1728
C_{15}	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band C trimmer 1st det	SC-A-1728
C_{16}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band D trimmer 1st det	SC-A-1728
C_{17}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band E trimmer 1st det	SC-A-1728
C_{18}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band F trimmer 1st det	SC-A-1728
C_{19}	3D289	Capacitor CA-289	Variable air; 3–25 μμf	Band A trimmer r. f. osc	SC-A-1728
C_{20}	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band B trimmer r. f. osc	SC-A-1728
C_{21}	3D291	Capacitor CA-291	Variable air; 6–100 μμf	Band C trimmer r. f. osc	SC-A-1728
C_{22}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band D trimmer r. f. osc	SC-A-1728
C_{23}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band E trimmer r. f. osc	SC-A-1728
C_{24}	3D290	Capacitor CA-290	Variable air; 4–50 μμf	Band F trimmer r. f. osc	SC-A-1728
C_{25}	3D294	Capacitor CA-294	Fixed air; 125 μμf	Padder 1st r. f	SC-D-2575
C_{26}	3D293	Capacitor CA-293	Variable air; 10–210 μμf	Antenna alinement	SC-A-2580
C_{27}	3D284	Capacitor CA-284	Molded, paper; .05 μf–400 v	1st r. f. bypass	SC-D-1995

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:04 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

47. Radio receiver BC–312–C.

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
C_{28}	See note	Capacitor	Ganged with C_{34}, C_{46}, C_{82}; 13–226 $\mu\mu$f.	1st r. f. tuning	SC–D–2568
C_{29}	3D195	Capacitor CA–195	Metal encased as one unit: 0.05 μf–300 v	1st r. f. cathode bypass	SC–D–512
C_{30}			0.05 μf–300 v	1st r. f. screen bypass	SC–D–512
C_{31}			0.05 μf–300 v	1st r. f. "B" supply bypass	SC–D–512
C_{32}	3D284	Capacitor CA–284	Molded, paper; 0.05 μf–400 v	1st r. f. plate bypass	SC–D–1995
C_{33}	3D266	Capacitor CA–266	Mica; 100 $\mu\mu$f	2d r. f. grid coupling	SC–D–1993
C_{34}	See note	Capacitor	Ganged with C_{28}, C_{46}, C_{82}; 13–226 $\mu\mu$f.	2d r. f. tuning	SC–D–2568
C_{35}	3D195	Capacitor CA–195	Metal encased as one unit: 0.05 μf–300 v	2d r. f. cathode bypass	SC–D–512
C_{36}			0.05 μf–300 v	2d r. f. screen bypass	SC–D–512
C_{37}			0.05 μf–300 v	2d r. f. "B" supply bypass	SC–D–512
C_{38}	3D294	Capacitor CA–294	Fixed air; 125 $\mu\mu$f	Padder, 1st det	SC–D–2575
C_{39}	3D284	Capacitor CA–284	Molded, paper; 0.05 μf–400 v	2d r. f. plate bypass	SC–D–1995
C_{40}	3D294	Capacitor CA–294	Fixed air; 125 $\mu\mu$f	Padder, r. f. osc	SC–D–2575
C_{41}	3D278	Capacitor CA–278	Mica; 5 $\mu\mu$f	C. w. osc. coupling	SC–D–1993
C_{42}	3D300	Capacitor CA–300	Mica, aged; 3,000 $\mu\mu$f	Band C padder r. f. osc	SC–D–1993
C_{43}	3D297	Capacitor CA–297	Mica, aged; 1,600 $\mu\mu$f	Band B padder r. f. osc	SC–D–1993
C_{44}	3D299	Capacitor CA–299	Mica, aged; 750 $\mu\mu$f	Band A padder r. f. ocs	SC–D–1993
C_{45}	3D266	Capacitor CA–266	Mica; 100 $\mu\mu$f	1st det. grid coupling	SC–D–1993
C_{46}	See note	Capacitor	Ganged with C_{28}, C_{34}, C_{82}; 13–226 $\mu\mu$f.	1st det. tuning	SC–D–2568
C_{47}	3D266	Capacitor CA–226	Mica; 100 $\mu\mu$f	R. f. osc. coupling	SC–D–1993
C_{48}	3D195	Capacitor CA–195	Metal encased as one unit: 0.05 μf–300 v	1st det. cathode bypass	SC–D–512
C_{49}			0.05 μf–300 v	1st det. screen bypass	SC–D–512
C_{50}			0.05 μf–300 v	1st det. "B" supply bypass	SC–D–512

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

C_{51}	3D323	Capacitor CA-323	Variable air, with shaft; 4-50 $\mu\mu f$	Crystal phasing	SC-A-1728
C_{52}	3D342	Capacitor CA-342	Mica; 100 $\mu\mu f$	1st i. f. grid coupling	SC-D-1993
C_{53}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu f$	1st det. plate	SC-D-1993
C_{54}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	1st det. plate bypass	RL-D-6222
C_{55}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu f$	2d i. f. grid	SC-D-1993
C_{56}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	2d i. f. a. v. c. bypass	RL-D-6222
C_{57}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu f$	1st i. f. plate	SC-D-1993
C_{58}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	1st i. f. plate bypass	RL-D-6222
C_{59}	3D302	Capacitor CA-302	Modification of CA-195: 0.05 μf-300 v	1st i. f. cathode bypass	SC-D-2567
C_{60}			0.05 μf-300 v	1st i. f. screen bypass	SC-D-2567
C_{61}			0.05 μf-300 v	1st i. f. "B" supply bypass	SC-D-2567
C_{62}	3D284	Capacitor CA-284	Molded, paper; 0.05 μf-400 v	1st det. a. v. c. bypass	SC-D-1995
C_{63}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	1st i. f. a. v. c. bypass	RL-D-6222
C_{64}	3D342	Capacitor CA-342	Mica; 100 $\mu\mu f$	2d det. grid	SC-D-1993
C_{65}	3D342	Capacitor CA-342	Mica; 100 $\mu\mu f$	2d i. f. plate	SC-D-1993
C_{66}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	2d i. f. plate bypass	RL-D-6222
C_{67}	3D279	Capacitor CA-279	Mica; 10 $\mu\mu f$	Diode a. v. c. coupling	SC-D-1993
C_{68}	3D301	Capacitor CA-301	Modification of CA-195: 0.05 μf-300 v	2d i. f. cathode bypass	SC-D-2567
C_{69}			0.05 μf-300 v	2d i. f. screen bypass	SC-D-2567
C_{70}			0.05 μf-300 v	2d i. f. "B" supply bypass	SC-D-2567
C_{71}	3D218	Capacitor CA-218	Mica; 150 $\mu\mu f$	Diode, r. f. bypass	SC-D-1993
C_{72}	3D193	Capacitor CA-193	Mica; 500 $\mu\mu f$	Diode, r. f. filter	SC-D-1993
C_{73}	3D301	Capacitor CA-301	Modification of CA-195: 0.05 μf-300 v	Diode, cathode bypass	SC-D-2567
C_{74}			0.05 μf-300 v	1st audio plate bypass	SC-D-2567
C_{75}			0.05 μf-300 v	A. v. c. filter bypass	SC-D-2567
C_{76}	3D371	Capacitor CA-371	Mica; 0.01 μf-450 v	1st audio plate r. f. bypass	RL-D-6222
C_{77}	Not used				
C_{78}	3D276	Capacitor CA-276	Metal encased as one unit: 0.1 μf-400 v	Heater bypass	SC-D-512
C_{79}			0.1 μf-400 v	Heater bypass	SC-D-512
C_{80}			0.1 μf-400 v	2d audio plate bypass	SC-D-512
C_{81}	3D281	Capacitor CA-281	Molded, paper; 0.01 μf-400 v	1st audio coupling	SC-D-1995

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
C_{82}	See note	Capacitor	Ganged with C_{28}, C_{34}, C_{46}; 13–226 $\mu\mu$f.	R. f. osc. tuning	SC–D–2568
C_{83}	3D277	Capacitor CA–277	Molded, paper; 0.1 μf–400 v	R. f. osc. plate bypass	SC–D–1995
C_{84}	3D280	Capacitor CA–280	Variable air, with shaft; 1–10 $\mu\mu$f	C. w. osc. tuning	SC–A–1728
C_{85}	3D253	Capacitor CA–253	Variable air; 4–75 $\mu\mu$f	C. w. osc. trimmer	SC–A–1728
C_{86}	3D266	Capacitor CA–266	Mica; 100 $\mu\mu$f	C. w. osc. grid	SC–D–1993
C_{87}	3D284	Capacitor CA–284	Molded, paper; 0.05 μf–400 v	C. w. osc. plate bypass	SC–D–1995
C_{88}	3D266	Capacitor CA–266	Mica; 100 $\mu\mu$f	R. f. osc. grid	SC–D–1993
C_{89}	Not used				
C_{90}	do				
C_{91}	do				
C_{92}	do				
C_{93}	do				
C_{94}	3D298	Capacitor CA–298	Mica; aged, 800 $\mu\mu$f	Crystal filter input	SC–D–1993
C_{95}	3D298	Capacitor CA–298	Mica; aged, 800 $\mu\mu$f	Crystal filter input	SC–D–1993
C_{96}	3D286	Capacitor CA–286	Mica; 75 $\mu\mu$f	C. w. osc. filter	SC–D–1993
C_{97}	3D286	Capacitor CA–286	Mica; 75 $\mu\mu$f	C. w. osc. filter	SC–D–1993
C_{98}	3D275	Capacitor CA–275	Paper; 4μf	2d audio cathode bypass	SC–D–512
C_{99}	3D284	Capacitor CA–284	Molded, paper; 0.05 μf–400 v	2d r. f. a. v. c. bypass	SC–D–1995
C_{100}	3D294	Capacitor CA–294	Fixed air; 125 $\mu\mu$f	2d r. f. padder	SC–D–2575
C_{101}	3D266	Capacitor CA–266	Mica; 100 $\mu\mu$f	1st r. f. grid coupling	SC–D–1993
C_{102}	3D284	Capacitor CA–284	Molded, paper; 0.05 μf-400 v	1st r. f. a. v. c. bypass	SC–D–1995
CX	2Z3501–6A	Crystal DC–6–A	470 kc	1st r. f. a. v. c. bypass	SC–D–2972
DM	3H1621B	Dynamotor DM–21–B		D. c. power supply	SC–A–2581
F_1	3Z1921A	Fuse FU–21–A	10 a.–25 v	Dynamotor and filaments	
F_2	3Z1921A	Fuse FU–21–A	10 a.–25 v	Pilot lights	
FL	3Z1890–6B	Filter FL–6–B	Removable unit	Power supply filter	SC–D–1866
J_1	2Z5534A	Jack JK–34–A	PHONES 1ST AUDIO	1st audio phones	SC–D–439

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

J_2	2Z5534A	Jack JK-34-A	PHONES 2ND AUDIO	2d audio phones	SC-D-439
J_3	2Z5533A	Jack JK-33-A	SPEAKER 2ND AUDIO	Speaker	SC-D-483
J_4	2Z5533A	Jack JK-33-A	MICRO	Microphone	SC-D-483
J_5	2Z5534A	Jack JK-34-A	KEY	Key	SC-D-439
L_1		Coil		Band A, 1st r. f	SC-D-2556
L_2		do		Band B, 1st r. f	SC-D-2556
L_3		do		Band C, 1st r. f	SC-D-2556
L_4		do		Band D, 1st r. f	SC-D-2556
L_5		do		Band E, 1st r. f	SC-D-2556
L_6		do		Band F, 1st r. f	SC-D-2556
L_7		do		Band A, 2d r. f	SC-D-2556
L_8		do		Band B, 2d r. f	SC-D-2556
L_9		do		Band C, 2d r. f	SC-D-2556
L_{10}		do		Band D, 2d r. f	SC-D-2556
L_{11}		do		Band E, 2d r. f	SC-D-2556
L_{12}		do		Band F, 2d r. f	SC-D-2556
L_{13}		do		Band A, 1st det	SC-D-2556
L_{14}		do		Band B, 1st det	SC-D-2556
L_{15}		do		Band C, 1st det	SC-D-2556
L_{16}		do		Band D, 1st det	SC-D-2556
L_{17}		do		Band E, 1st det	SC-D-2556
L_{18}		do		Band F, 1st det	SC-D-2556
L_{19}		do		Band A, r. f. osc	SC-D-2556
L_{20}		do		Band B, r. f. osc	SC-D-2556
L_{21}		do		Band C, r. f. osc	SC-D-2556
L_{22}		do		Band D, r. f. osc	SC-D-2556
L_{23}		do		Band E, r. f. osc	SC-D-2556
L_{24}		do		Band F, r. f. osc	SC-D-2556
L_{25}		Coils		Ignition suppressor	SC-D-2571
L_{26}		do		do	SC-D-2571
L_{27}		do		do	SC-D-2571

Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
L_{28}		Coils of transformer C–282.		1st detector	SC–D–2564
L_{29}		Coils of transformer C–283.		1st i. f	SC–D–2564
L_{30}		Coils of transformer C–284.		2d i. f	SC–D–2564
L_{31}		Coil		C. w. beat oscillator	SC–D–2563
L_{32}		do		Filter, c. w. oscillator	SC–D–2563
LM_1	2Z5893	Neon lamp		Antenna overload protection	SC–A–1801
LM_2	2Z5927	Lamp LM–27	Pilot lamp	Dial light	SC–D–2573
LM_3	2Z5927	Lamp LM–27	do	do	SC–D–2573
R_1	3Z4564	Resistor RS–164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 1st r. f	SC–D–970
R_2	3Z4569	Resistor RS–169	Carbon, insul.; 60,000 ohms, ½ w	Screen grid, 1st r. f	SC–D–970
R_3	3Z4549	Resistor RS–149	Carbon, insul.; 40,000 ohms, ½ w	Screen grid, 1st r. f	SC–D–970
R_4	3Z4572	Resistor RS–172	Carbon, 100,000 ohms, ⅓ w	A. v. c. filter, 1st r. f	SC–D–970
R_5	3Z4525	Resistor RS–125	Carbon, 1,000 ohms, ½ w	Plate filter, 1st r. f	SC–D–970
R_6	3Z4573	Resistor RS–173	Carbon, 2 megohms, ⅓ w	Grid, 2d r. f	SC–D–970
R_7	3Z4564	Resistor RS–164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 2d r. f	SC–D–970
R_8	3Z4569	Resistor RS–169	Carbon, insul.; 60,000 ohms, ½ w	Screen grid, 2d r. f	SC–D–970
R_9	3Z4549	Resistor RS–149	Carbon, insul.; 40,000 ohms, ½ w	Screen grid, 2d r. f	SC–D–970
R_{10}	3Z4572	Resistor RS–172	Carbon, 100,000 ohms, ⅓ w	A. v. c. filter, 2d r. f	SC–D–970
R_{11}	3Z4525	Resistor RS–125	Carbon, 1,000 ohms, ½ w	Plate filter, 2d r. f	SC–D–970
R_{12}	3Z4573	Resistor RS–173	Carbon, 2 megohms, ⅓ w	Grid, 1st det	SC–D–970
R_{13}	3Z4568	Resistor RS–168	Carbon, 50,000 ohms, ⅓ w	Suppressor bias, 1st det	SC–D–970
R_{14}	3Z4566	Resistor RS–166	Wire-wound, insul.; 350 ohms, 1 w.	Cathode bias, 1st det	SC–D–970

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

R_{15}	3Z4540	Resistor RS-140	Carbon, insul.; 30,000 ohms, ½ w.	Screen grid, 1st det.	SC-D-970
R_{16}	3Z4572	Resistor RS-172	Carbon, 100,000 ohms, ⅓ w.	A. v. c. filter, 1st det.	SC-D-970
R_{17}	3Z4525	Resistor RS-125	Carbon, insul.; 1,000 ohms, ½ w.	Plate filter, 1st det.	SC-D-970
R_{18}	3Z4572	Resistor RS-172	Carbon, 100,000 ohms, ⅓ w.	A. v. c. filter, 1st i. f.	SC-D-970
R_{19}	3Z4564	Resistor RS-164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 1st i. f.	SC-D-970
R_{20}	3Z4563	Resistor RS-163	Carbon, insul.; 60,000 ohms, 1 w.	Screen grid, 1st i. f.	SC-D-970
R_{21}	3Z4549	Resistor RS-149	Carbon, insul.; 40,000 ohms, ½ w.	Screen grid, 1st i. f.	SC-D-970
R_{22}	3Z4525	Resistor RS-125	Carbon, insul.; 1,000 ohms, ½ w.	Plate filter, 1st i. f.	SC-D-970
R_{23}	3Z4550	Resistor RS-150	Carbon, insul.; 100,000 ohms, ½ w.	A. v. c. filter, 2d i. f.	SC-D-970
R_{24}	3Z4564	Resistor RS-164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 2d i. f.	SC-D-970
R_{25}	3Z4563	Resistor RS-163	Carbon, insul.; 60,000 ohms, 1 w.	Screen grid, 2d i. f.	SC-D-970
R_{26}	3Z4549	Resistor RS-149	Carbon, insul.; 40,000 ohms, ½ w.	Screen grid, 2d i. f.	SC-D-970
R_{27}	3Z4525	Resistor RS-125	Carbon, insul.; 1,000 ohms, ½ w.	Plate filter, 2d i. f.	SC-D-970
R_{28}	3Z4571	Resistor RS-171	Wire-wound, insul.; 750 ohms, 1 w.	Cathode bias, diode	SC-D-970
R_{29}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	A. v. c. filter, diode	SC-D-970
R_{30}	3Z4561	Resistor RS-161	Carbon, 1 megohm, ⅓ w.	A. v. c. load	SC-D-970
R_{31}	3Z4623	Resistor RS-223	Wire-wound, insul.; 2,000 ohms, 1 w.	Cathode bias, 2d audio	SC-D-970
R_{32}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	Grid, 1st a. f.	SC-D-970
R_{33}	3Z4531	Resistor RS-131	Carbon, insul.; 50,000 ohms, ½ w.	Grid, 2d a. f.	SC-D-970
R_{34} / R_{35}	2Z7289	Potentiometer RS-174	{0-500,000 ohms / 0- 50,000 ohms} 1 w.	Dual volume control	SC-D-1982
R_{36}	3Z4550	Resistor RS-150	Carbon, insul.; 100,000 ohms, ½ w.	Minimum bias bleeder	SC-D-970

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
R_{37}	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	C. w. osc. plate	SC–D–970
R_{38}	3Z4569	Resistor RS–169	60,000 ohms, ½ w	Plate circuit loading	SC–D–970
R_{39}	Not used				
R_{40}	Not used				
R_{41}	3Z4539	Resistor RS–139	Carbon, insul.; 30,000 ohms, 1 w	Plate, r. f. osc	SC–D–970
R_{42}	3Z4540	Resistor RS–140	Carbon, insul.; 30,000 ohms, ½ w	Grid, r. f. osc	SC–D–970
R_{43}	3Z4548	Resistor RS–148	Carbon, insul.; 200,000 ohms, ½ w.	Grid, c. w. osc	SC–D–970
R_{44}	3Z4635	Resistor RS–235	Carbon, insul.; 3,000 ohms, 1 w	Cathode, band C, r. f. osc	SC–D–970
R_{45}	3Z4637	Resistor RS–237	Carbon, insul.; 5,000 ohms, 1 w	Cathode, band B, r. f. osc	SC–D–970
R_{46}	3Z4638	Resistor RS–238	Carbon, insul.; 7,500 ohms, 1 w	Cathode, band A, r. f. osc	SC–D–970
R_{47}	3Z4576	Resistor RS–176	Carbon, insul.; 60 ohms, ½ w	Filament shunt, diode	SC–D–970
R_{48}	3Z4569	Resistor RS–169	Carbon, insul.; 60,000 ohms, ½ w	Screen grid, 1st det	SC–D–970
R_{49}	3Z4533	Resistor RS–133	Carbon, insul.; 500,000 ohms, ½ w.	R. f. filter diode	SC–D–970
R_{50}	3Z4540	Resistor RS–140	Carbon, insul.; 30,000 ohms, ½ w	Screen grid, 1st det	SC–D–970
R_{51}	3Z4529	Resistor RS–129	Carbon, insul.; 10,000 ohms, ½ w	Filter load, c. w. osc	SC–D–970
R_{52}	3Z4575	Resistor RS–175	Carbon, 10,000 ohms, ⅓ w	A. v. c. filter, 1st i. f	SC–D–970
R_{53}	3Z4573	Resistor RS–173	Carbon, 2 megohms, ⅓ w	Grid, 1st r. f	SC–D–970
R_{54}	3Z4623	Resistor RS–223	Wire-wound, insul.; 2,000 ohms, 1 w.	2d audio bias	SC–D–970
RL_1	2Z7613	Relay BK–13		Antenna grounding	SC–D–1942
SO_1	2Z8794.1	Socket SO–94		Power supply and control	SC–D–2592
SW_1	3Z8131	Switch SW–131	Toggle (SEND REC)	Send-receive	SC–A–1042

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

SW_2	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 1st r. f. grid	SC-D-2553
SW_3	3Z8310-1	Switch	Ganged (BAND CHANGE)	Band change, 1st r. f. antenna	SC-D-2535
SW_4	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 2d r. f. grid	SC-D-2553
SW_5	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 1st r. f. plate	SC-D-2553
SW_6	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 1st det. grid	SC-D-2553
SW_7	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 2d r. f. plate	SC-D-2553
SW_8	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, r. f. osc. grid	SC-D-2553
SW_9	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, r. f. osc. plate	SC-D-2553
SW_{10}		Switch	Ganged to C_{51}	Crystal switch	SC-D-2564
SW_{11}	3Z8139	Switch SW-139	Toggle (CW OSC OFF ON)	C. w. osc	SC-A-1042
SW_{12}	3Z8119	Switch SW-119	Rotary (OFF MVC AVC)	On-off, m. v. c., a. v. c	SC-D-2574
T_1	2Z9805	Transformer C-205	Audio frequency 5,000/2,500 turn ratio.	1st audio	SC-D-2567
T_2	2Z9760	Transformer C-160	Audio frequency 5,000/1,885 turn ratio.	2d audio	SC-D-2569

NOTE.—C_{28}, C_{34}, C_{46}, and C_{82} ganged comprise capacitor CA-292 (3D292).

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:05 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

48. Radio receiver BC-314-C.

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
C_1	3D293	Capacitor CA-293	Variable air; 10-210 $\mu\mu$f	Antenna alinement	SC-A-2850
C_2	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band D trimmer, 1st r. f	SC-A-1728
C_3	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band C trimmer, 1st r. f	SC-A-1728
C_4	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band B trimmer, 1st r. f	SC-A-1728
C_5	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band A trimmer, 1st r. f	SC-A-1728
C_6	3D277	Capacitor CA-277	Molded, paper; 0.1 μf-400 v	1st r. f. bypass	SC-D-1995
C_7		See note	Ganged with C_{16}, C_{46}, and C_{67}; 13-256 $\mu\mu$f.	1st r. f. tuning	SC-D-2568
C_8	3D255	Capacitor CA-255	Metal encased as one unit: 0.1 μf-400 v	1st r. f. cathode bypass	SC-D-512
C_9			Metal encased as one unit: 0.1 μf-400 v	1st r. f. screen bypass	SC-D-512
C_{10}			Metal encased as one unit: 0.1 μf-400 v	1st r. f. "B" supply bypass	SC-D-512
C_{11}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band C trimmer, 2d r. f	SC-A-1728
C_{12}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band B trimmer, 2d r. f	SC-A-1728
C_{13}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band A trimmer, 2d r. f	SC-A-1728
C_{14}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band D trimmer, 2d r. f	SC-A-1728
C_{15}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf-400 v	1st r. f. plate bypass	SC-D-1995
C_{16}		See note	Ganged with C_7, C_{46} and C_{67}; 13-256 $\mu\mu$f.	2d r. f. tuning	SC-D-2568
C_{17}	3D255	Capacitor CA-255	Metal encased as one unit: 0.1 μf-400 v	2d r. f. cathode bypass	SC-D-512
C_{18}			Metal encased as one unit: 0.1 μf-400 v	2d r. f. screen bypass	SC-D-512
C_{19}			Metal encased as one unit: 0.1 μf-400 v	2d r. f. "B" supply bypass	SC-D-512
C_{20}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band C trimmer, 1st det	SC-A-1728
C_{21}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band B trimmer, 1st det	SC-A-1728
C_{22}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band A trimmer, 1st det	SC-A-1728
C_{23}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band D trimmer, r. f. osc	SC-A-1728
C_{24}	3D290	Capacitor CA-290	Variable air; 4-50 $\mu\mu$f	Band C trimmer, r. f. osc	SC-A-1728

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

C_{25}	3D290	Capacitor CA-290	Variable air; 4–50 $\mu\mu$f	Band B trimmer, r. f. osc	SC-A-1728
C_{26}	3D290	Capacitor CA-290	Variable air; 4–50 $\mu\mu$f	Band A trimmer, r. f. osc	SC-A-1728
C_{27}	3D290	Capacitor CA-290	Variable air; 4–50 $\mu\mu$f	Band D trimmer, 1st det	SC-A-1728
C_{28}	3D348	Capacitor CA-348	Mica; 2500 $\mu\mu$f	Band D padder, r. f. osc	SC-D-1993
C_{29}	3D347	Capacitor CA-347	Mica; 2,000 $\mu\mu$f	Band C padder, r. f. osc	SC-D-1993
C_{30}	3D346	Capacitor CA-346	Mica; 900 $\mu\mu$f	Band B padder, r. f. osc	SC-D-1993
C_{31}	3D345	Capacitor CA-345	Mica; 800 $\mu\mu$f	Band A padder, r. f. osc	SC-D-1993
C_{32}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu$f	1st i. f. grid coupling	SC-D-1993
C_{33}	3D371	Capacitor CA-371	Mica; 0.01 μf–450 v	1st i. f. a. v. c. bypass	RL-D-6222
C_{34}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu$f	1st det. plate	SC-D-1993
C_{35}	3D371	Capacitor CA-371	Mica; 0.01 μf–450 v	1st det. plate bypass	RL-D-6222
C_{36}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu$f	1st i. f. plate	SC-D-1998
C_{37}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v	1st i. f. plate bypass	SC-D-1995
C_{38}	3D372	Capacitor CA-372	Mica; 1000 $\mu\mu$f	2d i. f. grid coupling	SC-D-1467
C_{39}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v	2d i. f. a. v. c. bypass	SC-D-1995
C_{40}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu$f	Diode input	SC-D-1993
C_{41}	3D344	Capacitor CA-344	Mica; 400 $\mu\mu$f	2d i. f. plate	SC-D-1993
C_{42}	3D371	Capacitor CA-371	Mica; 0.01 μf–450 v	2d i. f. plate bypass	RL-D-6222
C_{43}	3D371	Capacitor CA-371	Mica; 0.01 μf–450 v	2d a. f. coupling	RL-D-6222
C_{44}	3D279	Capacitor CA-279	Mica; 10 $\mu\mu$f	C. w. osc. coupling	SC-D-1993
C_{45}	3D350	Capacitor CA-350	Mica; 25 $\mu\mu$f	Diode a. v. c. coupling	SC-D-1993
C_{46}		See note	Ganged with C_7, C_{16}, and C_{67}; 13–256 $\mu\mu$f.	1st det. tuning	SC-D-2568
C_{47}	3D349	Capacitor CA-349	Mica; 150 $\mu\mu$f	R. f. osc. coupling	SC-D-1993
C_{48}	3D255	Capacitor CA-255	Metal encased as one unit.	0.1 μf–400 v	1st det. cathode bypass	SC-D-512
C_{49}				0.1 μf–400 v	1st det. screen bypass	SC-D-512
C_{50}				0.1 μf–400 v	1st det. "B" supply bypass	SC-D-512
C_{51}	3D339	Capacitor CA-339	Metal encased as one unit.	0.1 μf–400 v	1st i. f. cathode bypass	SC-D-2567
C_{52}				0.1 μf–400 v	1st i. f. screen bypass	SC-D-2567
C_{53}				0.1 μf–400 v	1st i. f. "B" supply bypass	SC-D-2567

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
C_{54}	3D338	Capacitor CA-338	Metal encased as one unit. 0.1 μf–400 v.	2d i. f. cathode bypass	SC–D–2567
C_{55}			0.1 μf–400 v.	2d i. f. screen bypass	SC–D–2567
C_{56}			0.1 μf–400 v.	2d i. f. "B" supply bypass	SC–D–2567
C_{57}	3D338	Capacitor CA-338	Metal encased as one unit. 0.1 μf–400 v.	2d det. "B" supply bypass	SC–D–2567
C_{58}			0.1 μf–400 v.	2d det. cathode bypass	SC–D–2567
C_{59}			0.1 μf–400 v.	A. v. c. filter bypass	SC–D–2567
C_{60}	3D275	Capacitor CA-275	Paper; 4 μf–50 v	2d a. f. cathode bypass	SC–D–512
C_{61}	3D276	Capacitor CA-276	Metal encased as one unit. 0.1 μf–400 v.	Heater bypass	SC–D–512
C_{62}			0.1 μf–400 v.	Heater bypass	SC–D–512
C_{63}			0.1 μf–400 v.	2d a. f. plate bypass	SC–D–512
C_{64}	3D281	Capacitor CA-281	Molded, paper; 0.1 μf–400 v.	2d det. grid	SC–D–1995
C_{65}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v.	C. w. osc. plate bypass	SC–D–1995
C_{66}	3D364	Capacitor CA-364	Mica; 250 μμf–250 v	R. f. osc. grid	SC–D–1993
C_{67}		See note	Ganged with C_7, C_{16}, and C_{46}; 13–256 μμf.	R. f. osc. tuning	SC–D–2568
C_{68}	3D253	Capacitor CA-253	Variable air; 4–75 μμf	C. w. osc. tuning	SC–A–1728
C_{69}	3D291	Capacitor CA-291	Variable air; 6–100 μμf	C. w. osc. trimmer	SC–A–1728
C_{70}		Not used			
C_{71}		Not used			
C_{72}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v	R. f. osc. plate bypass	SC–D–1995
C_{73}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v	2d r. f. plate bypass	SC–D–1995
C_{74}	3D266	Capacitor CA-266	Mica; 100 μμf	C. w. osc. grid	SC–D–1995
C_{75}	3D193	Capacitor CA-193	Mica; 500 μμf	Diode r. f. bypass	SC–D–1993
C_{76}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf–400 v	1st r. f. screen bypass	SC–D–1995
C_{77}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band B padder, 2d r. f	SC–D–1993
C_{78}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band B padder, 1st det	SC–D–1993
C_{79}		Not used			
C_{80}	3D297	Capacitor CA-297	Mica; aged; 1,600 μμf	Diode r. f. bypass	SC–D–1993

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

C_{81}	3D277	Capacitor CA-277	Molded, paper; 0.1 μf-400 v	2d r. f. screen bypass	SC-D-1995
C_{82}	3D346	Capacitor CA-346	Mica; 900 μμf, iso. base	C. w. osc. padder	SC-D-1993
C_{83}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band A padder, 2d r. f	SC-D-1993
C_{84}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band A padder, 1st det	SC-D-1993
C_{85}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band D padder, 2d r. f	SC-D-1993
C_{86}	3D341	Capacitor CA-341	Mica; 25 μμf, iso. base	Band D padder, 1st det	SC-D-1993
FL	3Z1890-6B	Filter FL-6-B	Removable unit	Power supply filter	SC-D-1866
DM	3H1621B	Dynamotor DM-21-B		D. c. power supply	SC-A-2581
F_1	3Z1921A	Fuse FU-21-A	10 a.-25 v	Dynamotor and filaments	
F_2	3Z1921A	Fuse FU-21-A	10 a.-25 v	Pilot lights	
J_1	2Z5534A	Jack JK-34-A	PHONES 1ST AUDIO	1st audio phones	SC-D-439
J_2	2Z5534A	Jack JK-34-A	PHONES 2ND AUDIO	2d audio phones	SC-D-439
J_3	2Z5533A	Jack JK-33-A	SPEAKER 2ND AUDIO	Speaker	SC-D-483
J_4	2Z5533A	Jack JK-33-A	MICRO	Microphone	SC-D-483
J_5	2Z5534A	Jack JK-34-A	KEY	Key	SC-D-439
L_1		Coil		Band D, 1st r. f	SC-D-4170
L_2		do		Band C, 1st r. f	SC-D-4170
L_3		do		Band B, 1st r. f	SC-D-4170
L_4		do		Band A, 1st r. f	SC-D-4170
L_5		do		Band D, 2d r. f	SC-D-4170
L_6		do		Band D, 2d r. f	SC-D-4170
L_7		do		Band C, 2d r. f	SC-D-4170
L_8		do		Band C, 2d r. f	SC-D-4170
L_9		do		Band B, 2d r. f	SC-D-4170
L_{10}		do		Band B, 2d r. f	SC-D-4170
L_{11}		do		Band A, 2d r. f	SC-D-4170
L_{12}		do		Band A, 2d r. f	SC-D-4170
L_{13}		do		Band D, 1st det	SC-D-4170
L_{14}		do		Band D, 1st det	SC-D-4170
L_{15}		do		Band C, 1st det	SC-D-4170
L_{16}		do		Band C, 1st det	SC-D-4170
L_{17}		do		Band B, 1st det	SC-D-4170

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:06 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
L_{18}		do		Band B, 1st det	SC–D–4170
L_{19}		do		Band A, 1st det	SC–D–4170
L_{20}		do		Band A, 1st det	SC–D–4170
L_{21}		do		Band D, r. f. osc	SC–D–4170
L_{22}		do		Band D, r. f. osc	SC–D–4170
L_{23}		do		Band C, r. f. osc	SC–D–4170
L_{24}		do		Band C, r. f. osc	SC–D–4170
L_{25}		do		Band B, r. f. osc	SC–D–4170
L_{26}		do		Band B, r. f. osc	SC–D–4170
L_{27}		do		Band A, r. f. osc	SC–D–4170
L_{28}		do		Band A, r. f. osc	SC–D–4170
L_{29}		Coils of transformer C–292.		1st det. trans	SC–D–4171
L_{30}					
L_{31}		Coil of transformer C–293.		1st i. f. trans	SC–D–4171
L_{32}		Coils of transformer C–294.		2d i. f. trans	SC–D–4171
L_{33}					
L_{34}		Coil		C. w. osc	
LM_1	2Z5893	Lamp	Neon	Antenna overload protection	SC–A–1801
LM_2	2Z5927	Lamp LM–27	Pilot lamp	Dial light	SC–D–2573
LM_3	2Z5927	Lamp LM–27	do	do	SC–D–2573
R_1	3Z4561	Resistor RS–161	Carbon, 1 megohm, ⅓ w	Grid, 2d i. f	SC–D–970
R_2	3Z4566	Resistor RS–166	Wire-wound, insul.; 350 ohms, 1 w.	Cathode bias, 1st r. f	SC–D–970
R_3	3Z4541	Resistor RS–141	Carbon, insul.; 75,000 ohms, ½ w	Screen grid, 1st r. f	SC–D–970
R_4	3Z4549	Resistor RS–149	Carbon, insul.; 40,000 ohms, ½ w	Screen grid, 1st r. f	SC–D–970

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:12 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

R_5	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	A. v. c. filter, 1st r. f	SC–D–970
R_6	3Z4525	Resistor RS–125	Carbon, insul.; 1,000 ohms, ½ w.	Plate filter, 1st r. f	SC–D–970
R_7	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	A. v. c. filter, 2d r. f	SC–D–970
R_8	3Z4566	Resistor RS–166	Wire-wound, insul.; 350 ohms, 1 w.	Cathode bias, 2d r. f	SC–D–970
R_9	3Z4541	Resistor RS–141	Carbon, insul.; 75,000 ohms, ½ w.	Screen grid, 2d r. f	SC–D–970
R_{10}	3Z4549	Resistor RS–149	Carbon, insul.; 40,000 ohms, ½ w.	Screen grid, 2d r. f	SC–D–970
R_{11}	3Z4525	Resistor RS–125	Carbon, insul.; 1,000 ohms, ½ w.	Plate filter, 2d r. f	SC–D–970
R_{12}	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	A. v. c. filter, 1st det	SC–D–970
R_{13}	3Z4539	Resistor RS–139	Carbon, insul.; 30,000 ohms, 1 w.	Plate r. f. osc	SC–D–970
R_{14}	3Z4568	Resistor RS–168	Carbon, 50,000 ohms, ⅓ w	Suppressor bias, 1st det	SC–D–970
R_{15}	3Z4564	Resistor RS–164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 1st det	SC–D–970
R_{16}	3Z4540	Resistor RS–140	Carbon, insul.; 30,000 ohms, ½ w.	Screen grid, 1st det	SC–D–970
R_{17}	3Z4525	Resistor RS–125	Carbon, insul.; 1,000 ohms, ½ w.	Plate, 1st det	SC–D–970
R_{18}	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	A.v.c. filter, 1st i. f	SC–D–970
R_{19}	3Z4564	Resistor RS–164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 1st i. f	SC–D–970
R_{20}	3Z4563	Resistor RS–163	Carbon, insul.; 60,000 ohms, 1 w.	Screen grid, 1st i. f	SC–D–970
R_{21}	3Z4549	Resistor RS–149	Carbon, insul.; 40,000 ohms, ½ w.	Screen grid, 1st i. f	SC–D–970
R_{22}	3Z4525	Resistor RS–125	Carbon, insul.; 1,000 ohms, ½ w.	Plate, 1st i.f	SC–D–970
R_{23}	3Z4550	Resistor RS–150	Carbon, insul.; 100,000 ohms, ½ w.	A. v. c. filter. 2d i. f	SC–D–970
R_{24}	3Z4564	Resistor RS–164	Wire-wound, insul.; 500 ohms, 1 w.	Cathode bias, 2d i. f	SC–D–970

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:12 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Reference No.	Stock No.	Name of part	Description	Function	Drawing No.
R_{25}	3Z4563	Resistor RS-163	Carbon, insul.; 60,000 ohms, 1 w.	Screen grid, 2d i. f	SC-D-970
R_{26}	3Z4549	Resistor RS-149	Carbon, insul.; 40,000 ohms, ½ w.	Screen grid, 2d i. f	SC-D-970
R_{27}	3Z4525	Resistor RS-125	Carbon, insul.; 1,000 ohms, ½ w	Plate, 1st i. f	SC-D-970
R_{28}	3Z4531	Resistor RS-131	Carbon, insul.; 50,000 ohms, ½ w.	R. f. filter, diode	SC-D-970
R_{29}	2Z7289	Potentiometer RS-174	0-50,000 ohms 1 w	Dual vol. control	SC-D-1982
R_{30}			0-500,000 ohms		
R_{31}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	A. v. c. filter, diode	SC-D-970
R_{32}	3Z4561	Resistor RS-161	Carbon, 1 megohm, ⅓ w	A. v. c. load	SC-D-970
R_{33}	3Z4623	Resistor RS-223	Wire-wound, insul.; 2,000 ohms, 1 w.	Cathode bias, 2d a. f	SC-D-970
R_{34}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	Grid, 1st a. f	SC-D-970
R_{35}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	Grid, 2d a. f	SC-D-970
R_{36}	3Z4562	Resistor RS-162	Carbon, insul.; 250,000 ohms, ½ w.	Plate, c. w. osc	SC-D-970
R_{37}	3Z4571	Resistor RS-171	Wire-wound, insul.; 750 ohms, 1 w.	Cathode bias, diode	SC-D-970
R_{38}	3Z4531	Resistor RS-131	Carbon, insul.; 50,000 ohms, ½ w.	Grid, r. f. osc	SC-D-970
R_{39}	3Z4548	Resistor RS-148	Carbon, insul.; 200,000 ohms, ½ w.	Grid, c. w. osc	SC-D-970
R_{43}	3Z4576	Resistor RS-176	Carbon, insul.; 60 ohms, ½ w	Filament shunt, diode	SC-D-970

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Generated on 2015-09-25 15:13 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

R_{44}	3Z4511	Resistor RS-111	Carbon, insul.; 100,000 ohms, 1 w.	Minimum bias bleeder	SC-D-970
R_{45}	3Z4541	Resistor RS-141	Carbon, insul.; 75,000 ohms, ½ w.	Screen grid, 1st det	SC-D-970
R_{51}	3Z4531	Resistor RS-131	Carbon, insul.; 50,000 ohms, ½ w.	Plate, 1st i. f	SC-D-970
R_{52}	3Z4623	Resistor RS-225	Wire-wound, insul.; 2,000 ohms, 1 w.	Cathode bias, 2d a. f	SC-D-970
R_{53}	3Z4540	Resistor RS-140	Carbon, insul.; 30,000 ohms, ½ w.	Screen grid, 1st det	SC-D-970
RL_1	2Z7613	Relay BK-13		Antenna grounding	SC-D-1942
SO_1	2Z8794.1	Socket SO-94		Power supply and control	SC-D-2592
SW_1	3Z8131	Switch SW-131	Toggle (SEND REC)	Send receive	SC-A-1042
SW_2	3Z8310-2	Switch	Ganged (BAND CHANGE)	Band change, 1st r. f. grid	SC-D-2553
SW_3	3Z8310-1	do		Band change, 1st r. f. antenna	SC-D-2553
SW_4	3Z8310-2	do		Band change, 2d r. f. grid	SC-D-2553
SW_5	3Z8310-2	do		Band change, 1st r. f. plate	SC-D-2553
SW_6	3Z8310-2	do		Band change, 1st det. grid	SC-D-2553
SW_7	3Z8310-2	do		Band change, 2d r. f. plate	SC-D-2553
SW_8	3Z8310-2	do		Band change, r. f. osc. grid	SC-D-2553
SW_9	3Z8310-2	do		Band change, r. f. osc. plate	SC-D-2553
SW_{10}	3Z8139	Switch SW-139	Toggle (CW OSC OFF ON)	C. w. osc	SC-A-1042
SW_{11}	3Z8119	Switch SW-119	Rotary (OFF MVC AVC)	On off, m. v. c. a. v. c	SC-D-2574
T_1	2Z9805	Transformer C-205	Audio frequency 5,000/2,500 turn ratio.	1st audio	SC-D-2567
T_2	2Z9760	Transformer C-160	Audio frequency 5,000/1,885 turn ratio.	2d audio	SC-D-2569

NOTE.—C_7, C_{16}, C_{46}, and C_{67} are ganged as capacitor CA-340 (3D340).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

49. Power unit PE-49-C.—For a detailed list of the component parts of power unit PE-49-C see the instruction book for that equipment.

[A. G. 062.11 (4-4-41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

DISTRIBUTION:

R and H 4 (5); IBn 4 (2); Bn 11 (2); IC 4 (2), 11 (4).

(For explanation of symbols, see FM 21-6.)

Digitized by Google
U. S. GOVERNMENT PRINTING OFFICE: 1941
Original from UNIVERSITY OF CALIFORNIA
Generated on 2015-09-25 15:13 GMT / http://hdl.handle.net/2027/uc1.b3245426
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google