

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

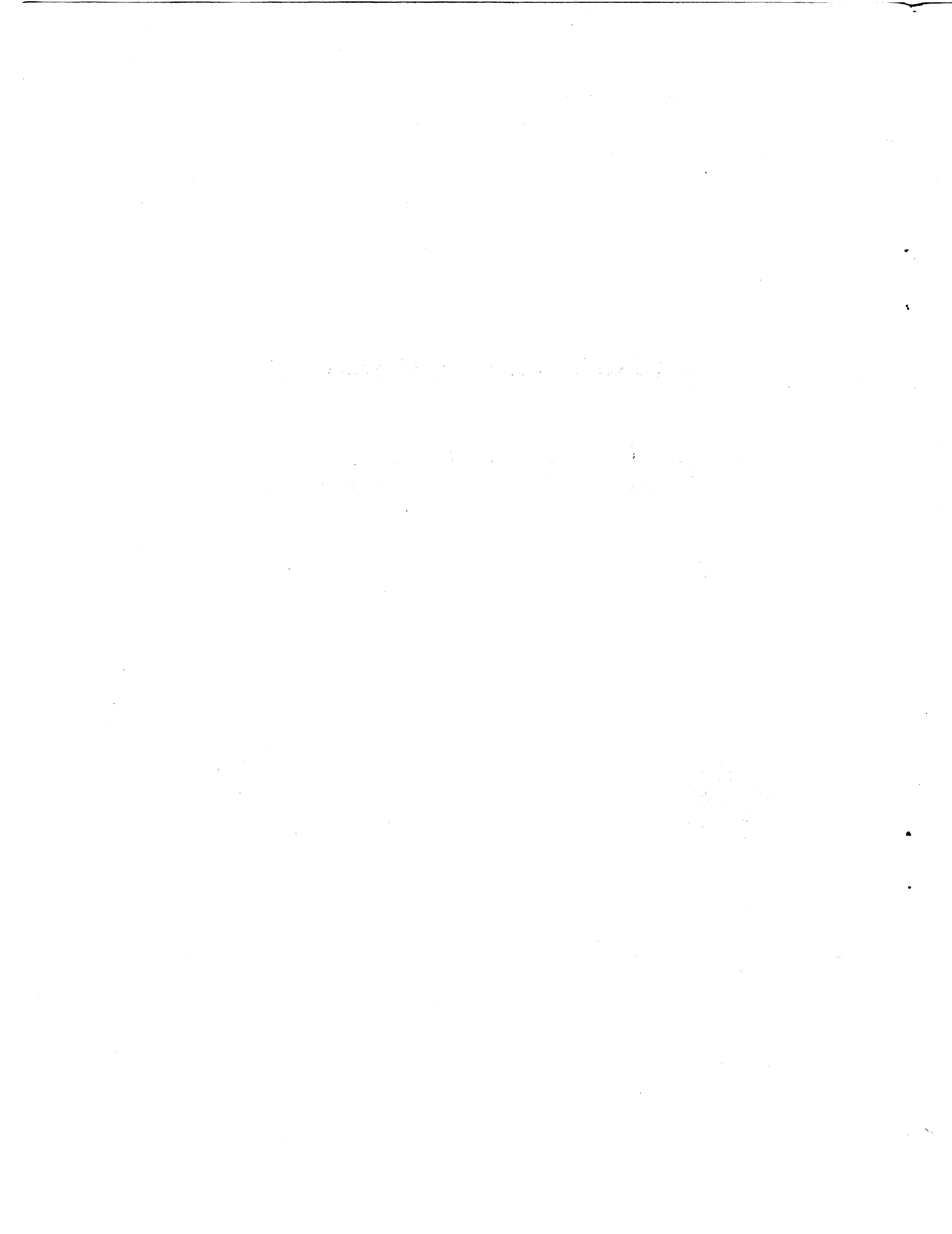
TM 11-4069
TO 16-30PRC6-5

RADIO SET AN/PRC-6
FIELD MAINTENANCE

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

JUNE 1952

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FIELD MAINTENANCE



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For explanation of distribution formula, see SR 310-90-1.

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Figure 1. Radio Set AN/PRC-6.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual contains information on the theory, trouble shooting, repair, alinement, and final testing of Radio Set AN/PRC-6 (fig. 1). Two appendixes covering a list of references and an identification table of parts also are provided. Operational and related information are covered in TM 11-296.

b. Official nomenclature followed by (*) is used to indicate all models of the item of equipment included in this manual. Thus, Handset H-33(*)/PT represents Handsets H-33C/PT and H-33D/PT.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army matériel and equipment:

a. DD Form 6, Report of Damaged or Im-

proper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army) and AFR 71-4 (Air Force).

b. DA AGO Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700-45-5.

c. DA AGO Form 11-238, Operator First Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

d. DA AGO Form 11-239, Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

e. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Radio Set AN/PRC-6 (fig. 1) is a miniaturized, low-power, battery-operated radio receiver and transmitter designed for f-m (frequency-modulated) communication over short distances. Highly portable, it is intended primarily as a handy-talkie for foot-combat troops.

b. The set is self-contained; all operating components necessary for reception and transmission are contained in a two-piece cast-magnesium case. The set may be held in either hand when operating. The microphone and the earphone are located inside the case in such a manner that the set resembles a hand-telephone. An

adjustable strap is attached to the case of Radio Set AN/PRC-6 for carrying and also to provide additional support when used in the operating position. The total weight of the equipment including the battery is approximately 7 pounds.

c. A coaxial jack is provided to accommodate a loop antenna. When the loop antenna is used, its directional characteristics enable the equipment to be used for homing purposes.

d. Provision is made also for a handset which may be used when the operator does not wish to hold the equipment or does not want to use the handset and earphone in the set.

4. Technical Characteristics

a. Transmitter (Part of Radio Receiver-Transmitter RT-196/PRC-6).

Frequency range:

One preset channel... 47 to 55.4 mc (megacycles)
(43 channels).

Transmitter type... Master oscillator power amplifier.

Type of signal transmitted... F-m voice.

Distance range... 1 mi^a.

Type of modulation... Frequency.

Number of tubes... 4 (+9 in receiver which also supplies afc (automatic frequency control) voltage).

Power input:

1.5 volts... 1,000 ma (milliamperes) (1.5 watts, filaments).

45 volts... 14 ma (milliamperes) (.63 watts, plate and screen).

90 volts... 28 ma (milliamperes) (2.52 watts, plate and screen).

R-f power output... .25 watts.

Antenna, whip-type... 24 in.

Power supply... Battery BA-270/U.

b. Receiver (Part of Radio Receiver-Transmitter RT-196/PRC-6).

Frequency range:

One preset channel... 47 to 55.4 mc (43 channels)
(Transmitter and receiver are tuned to the same channel).

Receiver type... Superheterodyne.

Type of signal received... f-m voice.

Number of tubes... 9.

Intermediate frequency... 4.3 mc.

Method of tuning... One channel preset to crystal.

Power input:

1.5 volts... 440 ma (.66 watts, filament).

45 volts... 13 ma (.59 watts, plate).

Power supply... Battery BA-270/U.

Antenna, whip-type... 24 in. long.

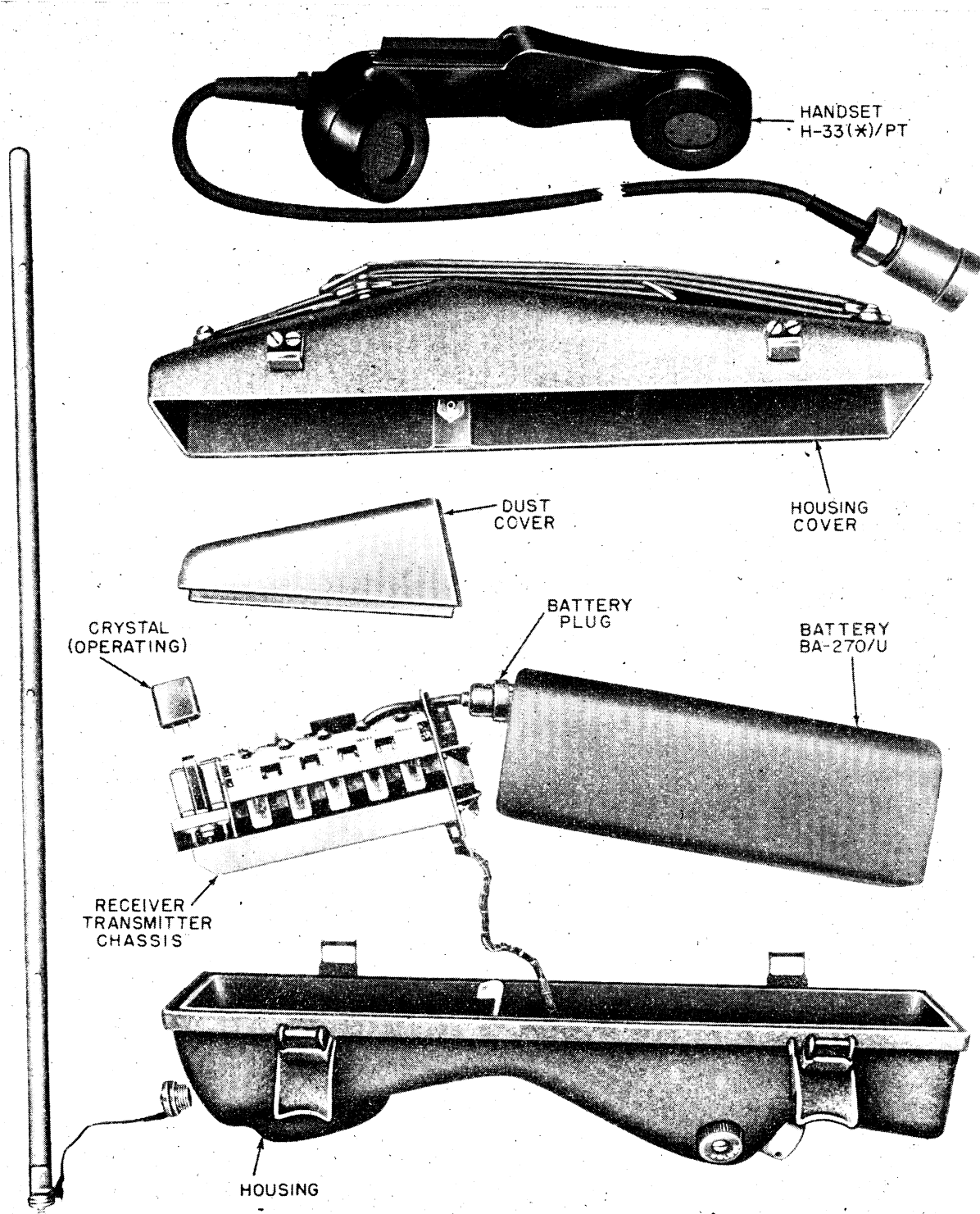
^a Depends on terrain and atmospheric conditions

5. Table of Components

(fig. 2)

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu in.)	Unit weight (lb)
Radio Set AN/PRC-6	1					
Radio Receiver-Transmitter RT-196/PRC-6.	1	14 $\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{1}{4}$	280	3 $\frac{1}{2}$
Crystal Unit CR-23/U	1	$\frac{1}{2}$	$\frac{3}{8}$	1 $\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$
Battery BA-270/U (must be requisitioned).	1	7 $\frac{1}{2}$	2 $\frac{5}{8}$	2 $\frac{3}{4}$	53 $\frac{1}{2}$	2 $\frac{1}{2}$
Handset H-33(*)/PT	1	1 $\frac{1}{2}$	8 $\frac{3}{8}$	3 $\frac{1}{4}$	41	$\frac{7}{8}$
Complete set of tubes	1	2 $\frac{3}{4}$	4 $\frac{1}{8}$	8 $\frac{7}{8}$	99	$\frac{3}{8}$
Instruction book	2	11	$\frac{3}{16}$	8 $\frac{1}{2}$		$\frac{1}{4}$

Note. This list is for general information only. See appropriate supply publications for information pertaining to requisition of spare parts.



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Figure 2. Radio Set AN/PRC-6, operating components.

CHAPTER 2

THEORY OF RADIO SET AN/PRC-6

6. Simplified Block Diagram (fig. 3)

a. Figure 3 is a simplified block diagram of Radio Set AN/PRC-6. As shown in the illustration, the active major components of the equipment are Radio Receiver-Transmitter RT-196/PRC-6, Handset H-33(*)/PT, and Battery BA-270/U. Radio Receiver-Transmitter RT-196/PRC-6 consists basically of a transmitter, a receiver, and associated control circuits.

b. The transmitter generates an f-m signal on one of 43 assigned channels. The channels, separated by 200-kc (kilocycle) intervals, cover the frequency range of 47.0 to 55.4 mc. Only one channel can be used at any one time.

c. The receiver is a crystal-controlled superheterodyne receiver that operates at the same frequency as the transmitter. During transmission, part of the transmitter signal is applied to the receiver. This transmitter signal is detected by the receiver and an afc (automatic frequency control) voltage is generated that corrects the transmitter frequency in the event of transmitter oscillator frequency drift.

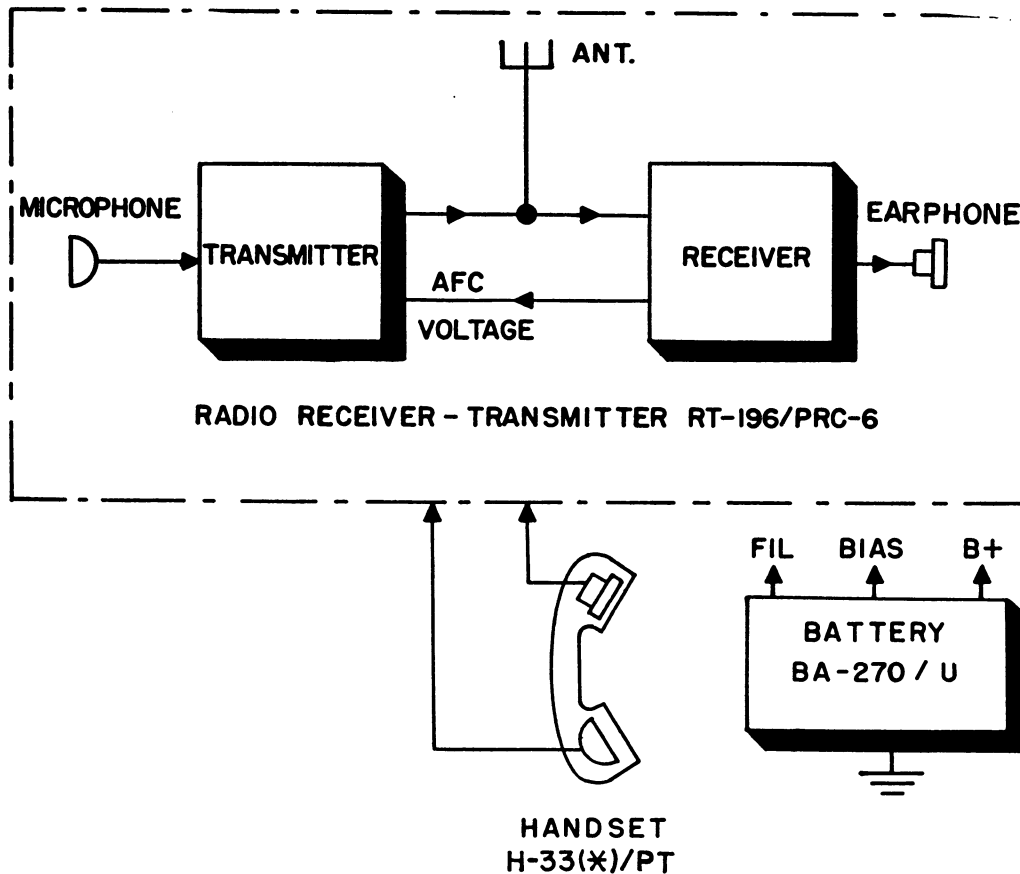
d. Power for the transmitter and the receiver are supplied by Battery BA-270/U. The battery, which supplies the plate, screen, filament, and bias power for the equipment, is contained in the same case as Radio Receiver-Transmitter RT-196/PRC-6. Switching circuits control the application of power to the equipment and provide for changing the equipment from a receiver to a transmitter and vice versa. Handset H-33(*)/PT contains a microphone and an earphone that are used when those in Radio Receiver-Transmitter RT-196/PRC-6 are not practicable or desirable.

7. Detailed Block Diagram (fig. 4)

a. Figure 4 is a detailed block diagram of Radio Set AN/PRC-6. Every stage of the equipment is represented by a block. The signal path is indicated by arrows; all tubes are used during transmission. The same antenna is used for both transmission and reception. A complete schematic diagram is shown in figure 30.

b. During reception, the incoming signal is applied to and amplified by r-f (radio-frequency) amplifiers V1 and V2. After amplification, the r-f signal is applied to mixer V3 which also receives a signal from crystal oscillator V9, at a frequency 4.3 mc below the channel frequency. Within the mixer, the r-f signal beats with the signal from the crystal oscillator, to produce a number of new signals, one of which is at a frequency of 4.3 mc. The 4.3-mc signal is selected by the output circuit of the mixer and applied to the 1st i-f (intermediate-frequency) amplifier. The i-f signal is amplified by i-f amplifiers V4, V5, and V6. The output of the last i-f amplifier is fed to limiter V7. The limiter insures that a constant amplitude signal is fed to the discriminator circuit. The discriminator circuit converts the f-m i-f signal into an audio signal. The discriminator circuit also generates an afc voltage which is fed back to the transmitter modulator V10 to correct the transmitter frequency in the event of transmitter oscillator frequency drift. The audio output of the discriminator circuit is applied to audio amplifier V8, amplified, and applied to the earphone.

c. During transmission, modulator V10 is excited by the audio signal from the microphone.



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Figure 3. Radio Set AN/PRC-6, simplified block diagram.

The audio signal causes the modulator to frequency modulate the output of oscillator V11 which oscillates at one-half the channel frequency. The modulated output of the oscillator is doubled in frequency by doubler V12, applied to power amplifier V13, and then fed to the antenna. Part of the transmitter output is applied to the receiver. This transmitter signal passes through the receiver stages and is applied to the discriminator circuit in the same manner as a received signal. The discriminator circuit generates an afc voltage whenever the frequency of the i-f signal, determined by the transmitter output frequency, deviates from 4.3 mc. This afc voltage is applied to the modulator which then corrects the frequency of the oscillator. The afc circuit, in effect, makes the transmitter crystal-controlled by keeping the oscillator resting frequency 4.3 mc above the crystal frequency. Whenever the frequency deviates, the discriminator receives an input at a fre-

quency other than 4.3 mc and a voltage is generated to correct the input to 4.3 mc.

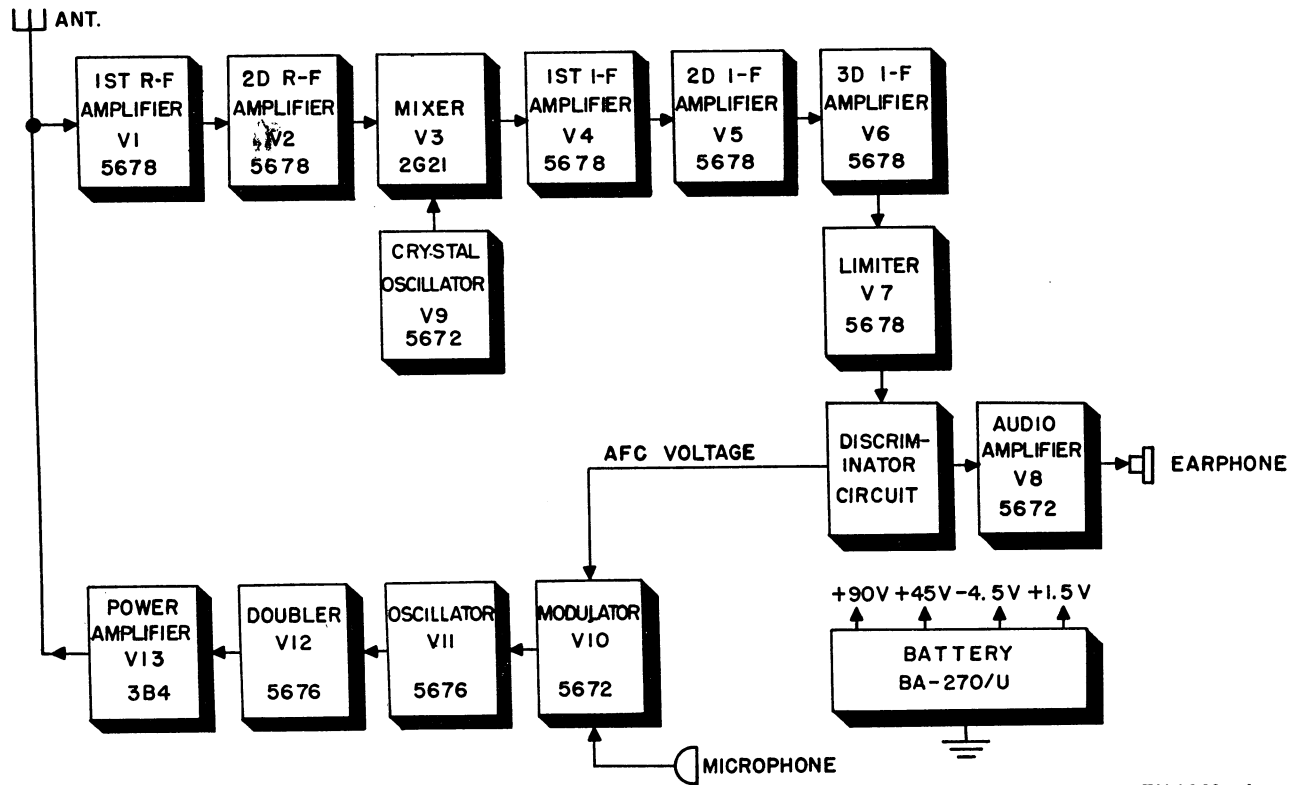
8. Stage Analysis

Paragraphs 9 through 27 explain the operation of each circuit in the equipment. To facilitate the understanding of the contribution of each circuit to the over-all functioning of the equipment, the circuits are discussed in signal flow sequence. The antenna, which is common to both the transmitter and the receiver, is analyzed first; the transmitter circuits and the receiver circuits are treated next. Control circuits and the handset are discussed last.

9. Antenna Circuit

(fig. 5)

a. The antenna normally used with Radio Set AN/PRC-6 is a nondirectional vertical antenna, approximately 24 inches long, fabricated from



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Figure 4. Radio Set AN/PRC-6, detailed block diagram.

flexible steel tape. The antenna functions both to radiate r-f energy and to pick up signals from other transmitters. The receiver is always connected to the antenna and no provision is made to decouple or disable the receiver during transmitting periods. This is possible because the receiver input circuit automatically reduces the sensitivity of the receiver during periods of excessive signal strength. See paragraph 17.

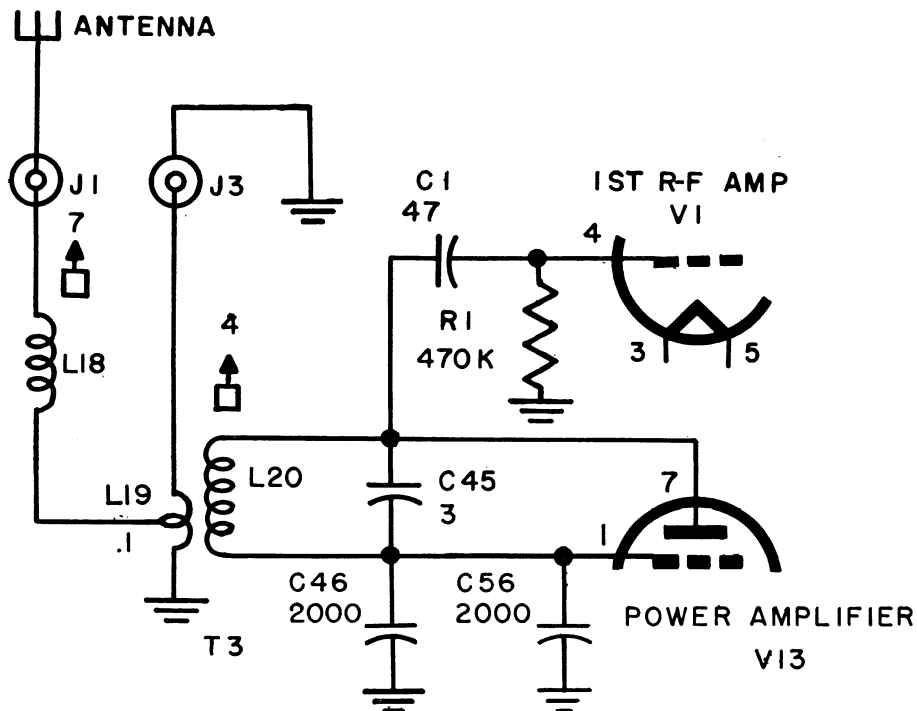
b. The complete antenna circuit consists of the steel-tape vertical antenna, connector J1, variable inductor L18, transformer T3 consisting of inductors L19 and L20, capacitor C45, and coaxial jack J3. Inductor L18 is required to increase the electrical length of the antenna. The length of a quarter-wave antenna at 47 mc is approximately 5 feet. The 24-inch antenna acts as a capacitance at this frequency. During alignment, inductor L18 is adjusted (by counter 7) to provide exactly the amount of inductive loading required to make the electrical length of the antenna and inductor L18 correspond to a quarter-wave length at the operating frequency.

c. Inductors L19 and L20 are located close to each other and therefore function as a transformer, although they are separately replaceable. The transformer action of the inductors matches the low impedance of the antenna to the high impedance of the transmitter output circuit and the receiver input circuit. In combination with capacitor C45, inductor L20 forms a resonant circuit which acts as the plate load for transmitter power amplifier V13 and the grid circuit for r-f amplifier V1. Capacitor C46 provides an r-f ground for this circuit. Coaxial jack J3 is provided to accommodate a loop antenna (Antenna AT-249/GRD) which enables the equipment to be used for homing.

10. Transmitter Circuits

(figs. 4 and 21)

a. The transmitter section of Radio Set AN/PRC-6 generates an f-m r-f signal that is applied to the antenna circuit and radiated into space. The r-f signal is frequency-modulated at a rate determined by the audio signal input



NOTE
UNLESS OTHERWISE SHOWN
CAPACITORS ARE IN UUF.
INDUCTANCES ARE IN UH.

TM 4069-5

Figure 5. Radio Set AN/PRC-6, simplified schematic of antenna circuit. (Some equipments do not use C56.)

into the microphone. A portion of the transmitter output is applied to the receiver circuits for the purpose of generating an afc voltage to compensate for frequency drift of the transmitter oscillator. The transmitter circuits are composed of oscillator V11, modulator V10, doubler V12, power amplifier V13, and the microphone.

b. Plate power for the transmitter circuits is applied by grounding the negative lead of the 45- and 90-volt batteries through the EXT.-OFF-INT. switch in the INT. or EXT. positions. However the tubes will not function since the filaments are not energized. To apply filament power and render the transmitter operative, the PUSH-TO-TALK switch must be depressed.

11. Tube Bias

All the tubes in this equipment are directly heated by the 1.5-volt portion of Battery BA-

270/U. The 1.5-volt supply used to energize the filaments also acts to provide fixed bias for all the tubes. The *high* or *hot* side of each filament is connected to the positive terminal of the 1.5-volt battery. The voltage at the center of the filament is half the voltage between the extreme ends: that is, .75 volts. The average filament potential of .75 volts positive with respect to ground, is the fixed bias for this equipment. No fixed bias is applied to the control grids. In addition to the fixed bias, the limiter, both oscillators, the doubler, and the final amplifier develop appreciable grid bias during operation. The audio amplifier and the modulator also have $4\frac{1}{2}$ volts fixed negative bias from the $4\frac{1}{2}$ -volt section of Battery BA-270/U.

12. Oscillator V11

(fig. 6)

a. Oscillator V11 determines the output frequency of the transmitter. It operates at one-

half the channel frequency. Since the frequency range of Radio Set AN/PRC-6 is 47 to 55.4 mc, V11 oscillates over the frequency range of 23.5 to 27.7 mc.

b. Oscillator V11 is a conventional Colpitts oscillator. The tuned circuit consists of variable inductor L22 (slug-tuned) and capacitors C50 and C51. Capacitor C50 is shunted by the circuit consisting of capacitors C47 and C48 and crystal rectifier CR3, in series (A of fig. 6). It is this circuit which varies the frequency of the oscillator. The resistance of CR3 is determined by the plate current of the modulator tube, which is controlled by both the audio signal generated by the microphone and the afc voltage generated by the discriminator. Complete details explaining how the operation of the modulator stage control resistance variations of CR3 are given in paragraph 13.

c. In order to simplify the explanation of the circuit, which would involve vectors, assume that the resistance of CR3 varies from zero to infinity. Actually, the resistance of CR3 never reaches these values.

- (1) When the resistance of CR3 is infinite, CR3 represents an open circuit, and there is no shunt capacitance placed across C50 (B of fig. 6).
- (2) When the resistance of CR3 is 0, CR3 can be considered as a short, and the effective shunt capacitance placed across C50 consists of C47 and C48 in series (C of fig. 6).
- (3) For intermediate values of the resistance of CR3, the amount of effective shunt capacitance placed across C50 is between the extremes shown in B and C of figure 6.
- (4) To be technically correct, a variation in the resistance of CR3 changes the angle and magnitude of impedance of the series combination of C48, CR3, and C47, and thus changes the effective shunt capacitance across C50.
- (5) As the shunt capacitance across C50 is varied by the change in the resistance of CR3, the resonant frequency of the oscillator is likewise varied. If the resistance of CR3 varies at an audio rate, the output frequency of the

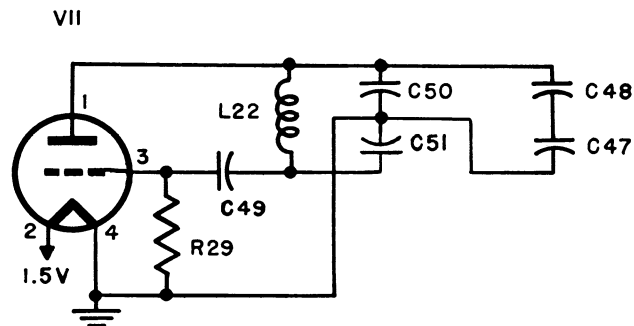
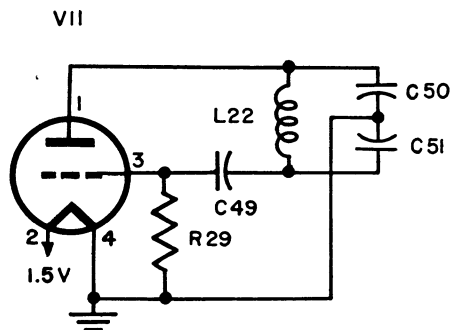
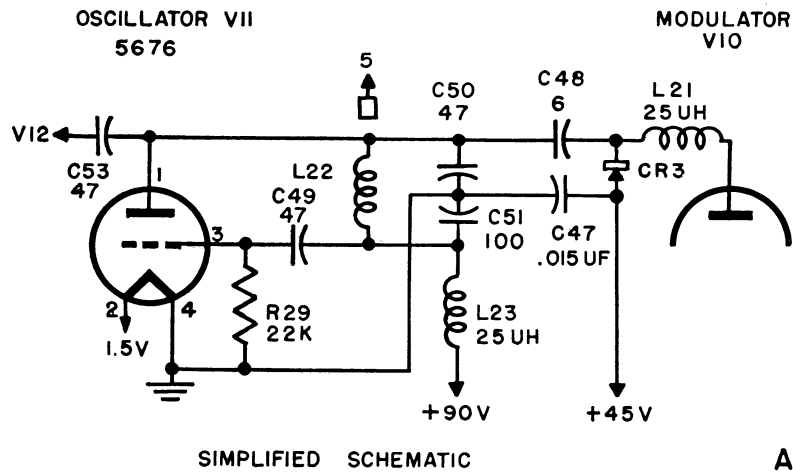
oscillator likewise varies at an audio rate. The modulator plate current varies the resistance of CR3 under control of the audio signal from the microphone and the afc voltage from the discriminator.

d. The output signal developed by the oscillator is capacitively coupled to doubler V12 by capacitor C53. Plate voltage for the oscillator is supplied by the 90-volt section of Battery BA-270/U. To prevent any r-f energy from entering the d-c supply, inductor L23 is inserted in series with the plate supply lead. Capacitor C49 functions as a d-c blocking capacitor. D-c ground return for the grid is provided by resistor R29.

13. Modulator V10 (fig. 7)

a. The purpose of the modulator is to control the resistance of CR3 so that the frequency of oscillator V11 varies in accordance with the audio and afc voltages applied to the grid of the modulator. The functioning of the modulator circuit depends on the characteristics of crystal rectifier CR3. The current versus resistance characteristics of crystal rectifier CR3 are graphed in figure 8. The curve indicates that the resistance of CR3 varies for different currents. When an audio voltage is applied to the grid of the modulator, the plate current changes at an audio rate and this in turn changes the resistance of CR3 at an audio rate. This change in resistance is used to modulate the frequency of the oscillator as explained in paragraph 12.

b. The plate current of the modulator tube flows through crystal rectifier CR3. By varying the plate current of the modulator the resistance of CR3 and hence the oscillator frequency is changed. The plate current is varied by the two voltages applied to the grid namely, the audio input voltage and the afc voltage developed by the discriminator. When the audio voltage is applied to the grid of the modulator through the microphone transformer T2, the plate current and, hence, the resistance of CR3 varies at an audio rate. The resistance change in CR3 varies the frequency of the oscillator at an audio rate and frequency modulation of the transmitter is effected. The afc voltage that



NOTE.
UNLESS OTHERWISE SHOWN
RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

TM 4069-6

Figure 6. Radio Set AN/PRC-6, simplified schematic and equivalent circuit of oscillator stage.

is applied to the modulator grid is generated by the discriminator whenever the oscillator frequency drifts and causes the transmitter frequency to deviate from the assigned frequency. The afc voltage varies the bias at the grid of the modulator, changing the plate current and thereby correcting the frequency of the oscillator to the proper value. Details of the process whereby the afc voltage is generated are given in the analysis of the discriminator (par. 24).

c. The audio voltage appearing across the secondary of T2 is applied to a voltage divider, R24 and R25. The audio voltage across R25 is applied between grid and cathode of V10 in series with C38. Since the impedance of C38 decreases as the audio frequency increases, more audio voltage is applied to V10 at 3,000 cycles per second than at 1,000 cycles per second. This circuit thus discriminates in favor of the higher audio frequencies. As a result, the higher audio frequencies cause a greater frequency swing (deviation) than the lower audio frequencies. This rising characteristic or pre-emphasis is used to compensate for the fact that in ordinary speech the higher audio frequencies are relatively weak, produce a rela-

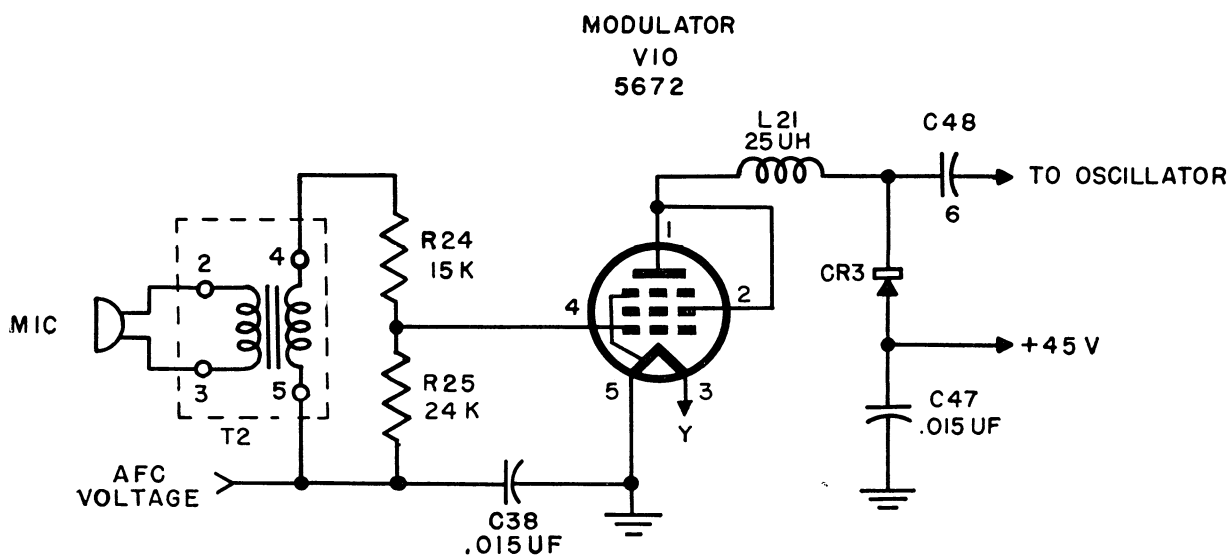
tively small frequency deviation, and therefore can be affected by random noise to a greater degree than by the lower audio frequencies. After the signal is received and detected in the receiver, a de-emphasis circuit restores the audio signal to its original form.

14. Doubler V12

(fig. 9)

a. Doubler V12 receives the output of the oscillator, doubles its frequency, and applies the output to power amplifier V13. Basically, the circuit is a high-gain r-f amplifier; the plate load consisting of variable inductor L24 (slug-tuned by counter 6) in parallel with capacitor C54. The plate circuit is tuned to one of the channels between 47 and 55.4 mc, twice the output of the oscillator. The circuit will function most efficiently only if the plate tank circuit is tuned to exactly double the input signal frequency.

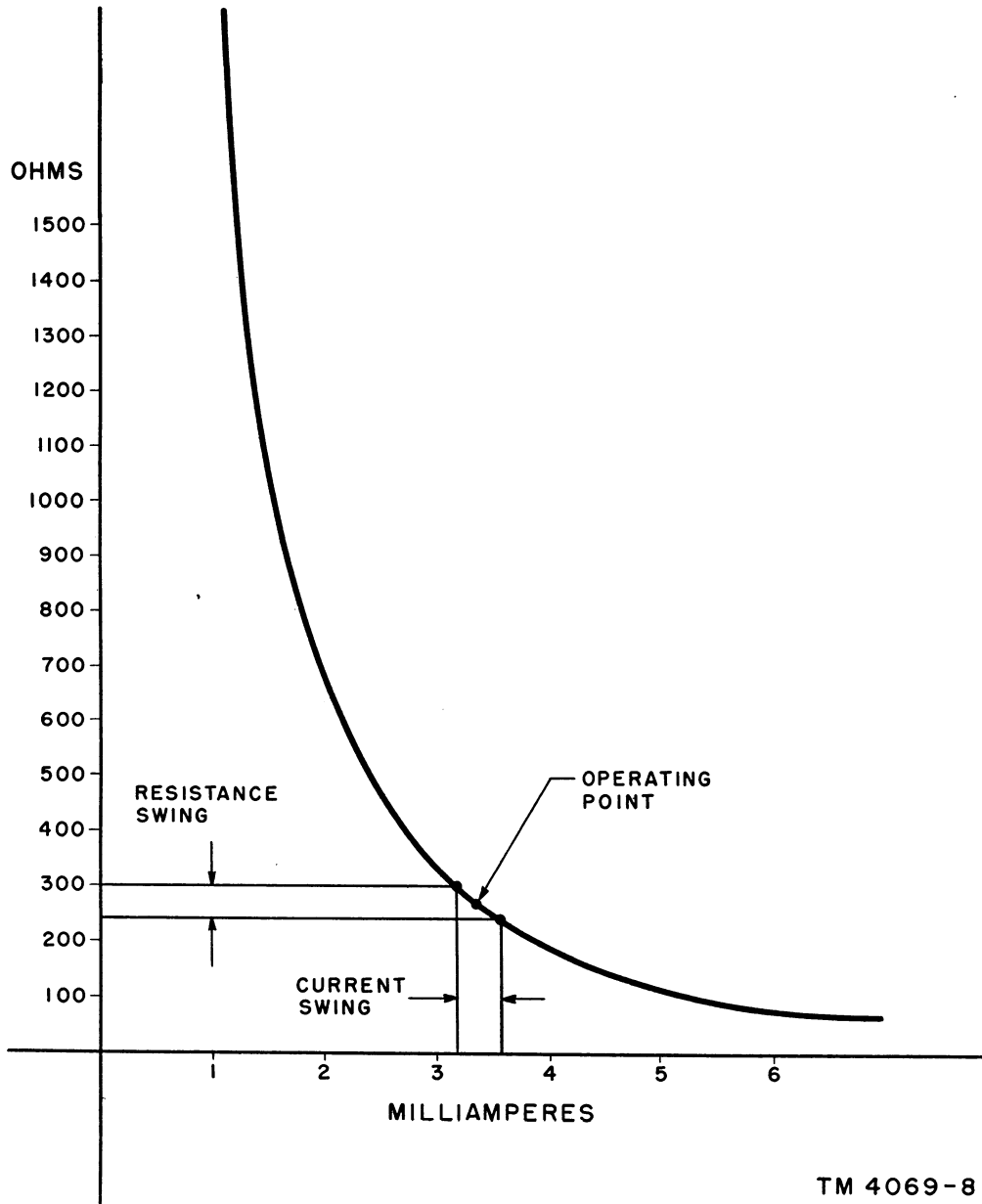
b. The output of the doubler is capacitively coupled to the power amplifier by capacitor C55. Ground return for the grid is provided by resistor R30.



NOTE
UNLESS OTHERWISE SHOWN
RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

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Figure 7. Radio Set AN/PRC-6, simplified schematic of modulator stage.



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Figure 8. Characteristics of crystal rectifier CR3 (current versus resistance).

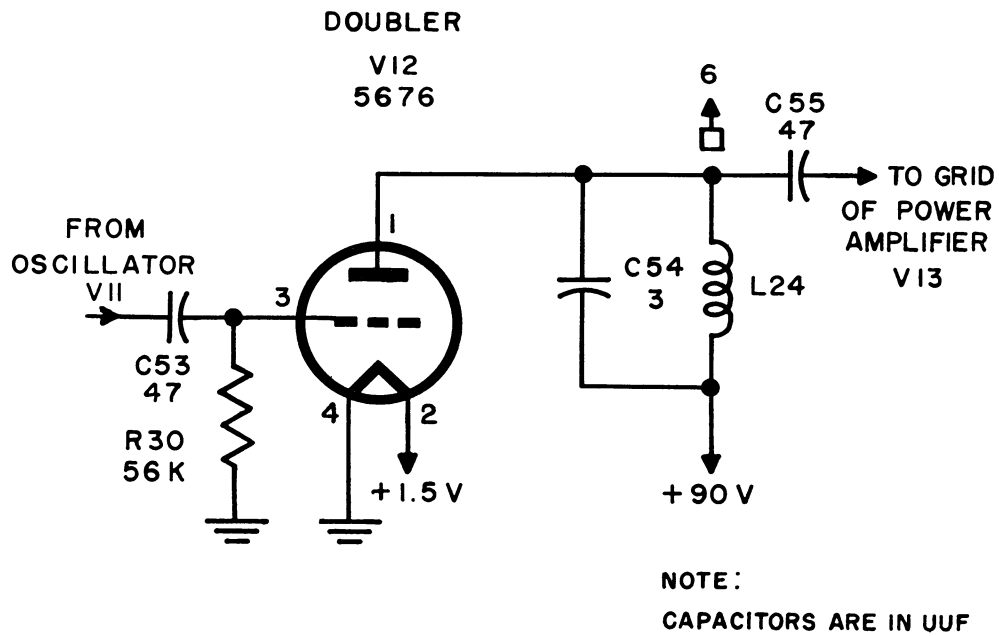
15. Power Amplifier V13

(fig. 10)

a. Power amplifier V13, the output amplifier of the transmitter, is driven by the doubler. The output of the stage is applied to the tank circuit consisting of L20 and C45 which resonate at the channel frequency.

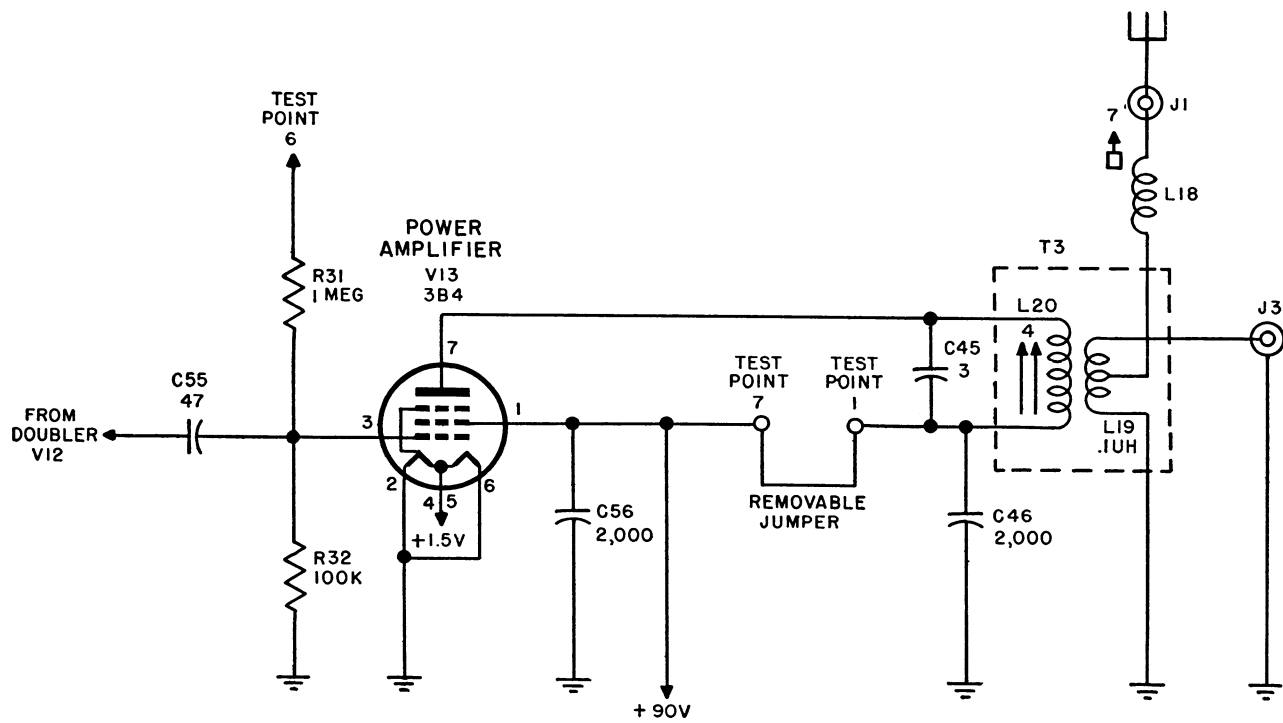
b. The grid is connected to test point 6 of J2 in order that the bias developed by grid current may be measured during alinement. The

magnitude of the bias is an index to the amplitude of grid drive and thus serves to indicate when the doubler is tuned properly. Correct tuning is indicated when the voltage at test point 6 is maximum negative. Resistor R31 in the lead to test point 6 is an isolating resistor that is inserted in the circuit to prevent the capacity of the voltage measuring instrument from detuning the plate circuit of the doubler. Resistor R32 in the grid circuit provides a d-c return to ground.



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Figure 9. Radio Set AN/PRC-6, simplified schematic of doubler stage.



NOTES:

1. TEST POINTS ARE PART OF J2.
2. CAPACITORS ARE IN UUF, UNLESS OTHERWISE SHOWN.

TM 4069-10

Figure 10. Radio Set AN/PRC-6, simplified schematic of power amplifier stage.
(Some equipments do not have C56.)

c. The signal developed in the plate circuit of V13 is coupled to the antenna circuit by T3. Plate power for this stage is obtained from the 90-volt section of Battery BA-270/U through a jumper connected between test points 1 and 7 of J2. During alinement, the jumper is removed and a milliammeter is inserted in its place. The milliammeter then reads plate current. Inductor L20 is adjusted for minimum plate current. C56 is the screen r-f bypass. C46 is the plate tank decoupling capacitor.

Note. Some equipments do not have C56.

16. Receiver Circuits

(fig. 4)

a. The receiver circuits are those that receive, amplify, and detect f-m signals in the frequency range from 47 to 55.4 mc. During transmission periods, the receiver circuits generate an afc voltage that corrects the resting frequency of the transmitter oscillator in the event of frequency drift.

b. Power for the receiver circuits is obtained from Battery BA-270/U. The receiver circuits are energized when the EXT.-OFF-INT. switch is placed in the INT. or EXT. position.

17. 1st R-f Amplifier V1

(fig. 11)

a. The 1st r-f amplifier stage V1 is a tuned r-f amplifier whose gain increases the sensitivity and the image rejection of the receiver. The input circuit consists of the antenna, loading inductance L18, coupling inductance L19, tunable inductor L20, capacitor C45, capacitor C1, and resistor R1. During reception, tuned circuit L20 and capacitor C45 reject all signals outside the narrow band centered around its resonant frequency and couples the accepted signal to the control grid of V1 through capacitor C1. The signal is amplified and coupled to the 2d r-f amplifier V2 by capacitor C4.

b. During reception, bias is provided by the filament supply (par. 11). During transmission, additional grid leak bias is provided by capacitor C1 and resistor R1. The amplitude of the input signal is very large and the grid current drawn biases the stage considerably below cutoff. This bias prevents the relatively

powerful transmitted signal from damaging the tube, yet allows enough signal to pass to develop sidetone and energize the afc loop as described in paragraph 7.

c. Because all the tubes in Radio Set AN/PRC-6 are directly heated and share a common power supply, isolating or decoupling circuits are required in every filament lead to prevent regeneration arising from filament-to-filament coupling. Inductor L1 in the positive filament lead of this tube provides filament power supply decoupling for this stage. The problem of preventing the same type of feedback through the B+ power supply is solved by incorporating power supply decoupling or bypass networks in the B+ lead of every stage. Capacitor C3 and resistor R2 are the B+ decoupling network for 1st r-f amplifier V1.

d. The plate load is the resonant tank composed of capacitor C2 and variable inductor L2. L2 is made variable by a powdered iron slug which is inserted or withdrawn from the core in order to accomplish the adjustment. During alinement, inductor L2 is adjusted (by counter 2) to resonate with capacitor C2 at the channel frequency. The band-pass characteristics of the tuned increase the selectivity and the image-rejection ratio of the receiver.

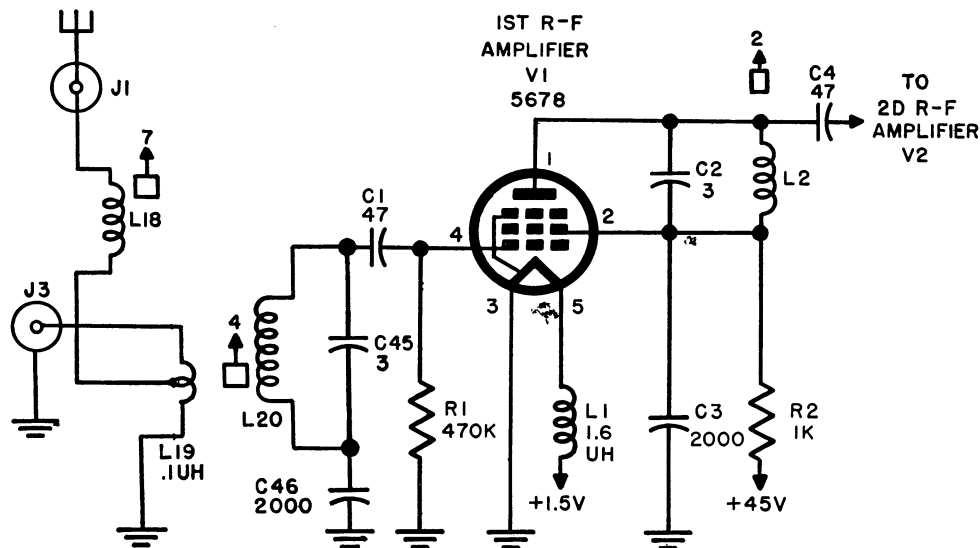
18. 2d R-f Amplifier V2

(fig. 12)

a. V2 is a tuned r-f amplifier whose gain increases the sensitivity and the image rejection of the receiver in the same manner as 1st r-f amplifier V1. Bias for this stage is provided by the filament supply (par. 11). Coupling capacitor C4 also functions as a d-c blocking capacitor isolating the +45 d-c supply on the plate of V1 from the control grid of V2. Resistor R3 is the d-c ground return for the grid circuit.

b. Capacitors C5 and C6 and inductor L3 in the filament circuit comprise a low-pass filter providing filament power supply decoupling. B+ power supply decoupling is provided by resistor R4 in conjunction with capacitor C8.

c. The plate load for this stage is the resonant circuit composed of capacitor C7 and variable inductor L4. Since a parallel resonant circuit offers a maximum impedance at one fre-



NOTE:
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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

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Figure 11. Radio Set AN/PRC-6, simplified schematic of 1st r-f amplifier stage.

quency, and since the impedance falls off rapidly on either side of the resonant frequency, only a narrow band of frequencies is amplified and coupled to the next stage, mixer V3. The amplified r-f output of this stage is capacity-coupled to V3 by capacitor C9.

19. Mixer V3

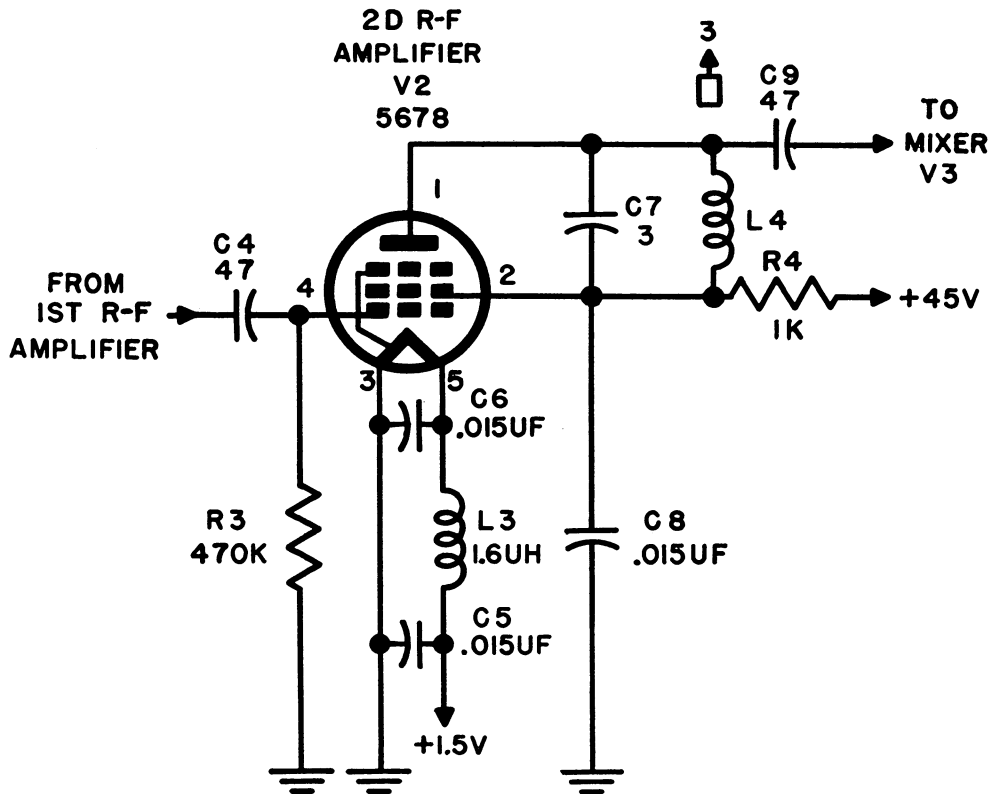
(fig. 13)

a. Within the mixer, the output of 2d r-f amplifier V2 beats with the output of crystal oscillator V9. A difference frequency of 4.3 mc is developed and coupled to the first i-f amplifier. Tube type 2G21 contains a heptode (five grids) and a triode within the same envelope. The control grids of both sections are internally tied together; the triode plate and the heptode screen are externally connected. The triode section is not used in this equipment.

b. The r-f signal from V2 is injected at grid (pin 5) by means of capacitor C9 and resistor R5. The local oscillator signal, 4.3 mc below the r-f signal, is coupled to grid 1 (pin 3) by capacitor C41. Because of the nonlinearity of

the stage, the two original frequencies plus the sum and the difference frequencies appear at the plate and are applied to the parallel resonant circuit consisting of capacitor C10 and variable inductor L6. Since the parallel resonant circuit is tuned to 4.3 mc, this difference frequency only is coupled to the input of 1st i-f amplifier V4 by capacitor C14.

c. To facilitate alinement of the crystal oscillator, test point 2 of J2 is connected to the control grid V3 in order that the magnitude of the crystal oscillator drive can be determined. As the output level of the crystal oscillator increases, the control grid of V3 draws grid current. This grid current develops grid-leak bias with the aid of resistor R6 and capacitor C41. The amount of grid current flow is directly proportional to the drive supplied by the crystal oscillator. Resistor R26, in conjunction with the distributed and circuit capacities, functions as a low-pass filter that permits the d-c voltage developed across R6 to be coupled to the meter, but blocks the oscillator signal. The crystal oscillator is tuned properly when the voltage at test point 2 is just below maximum.



NOTE:
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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

TM 4069-12

Figure 12. Radio Set AN/PRC-6, simplified schematic of 2d r-f amplifier stage.

d. B+ power supply decoupling is accomplished by resistor R7 and capacitor C13. Filament power supply decoupling is accomplished by the low-pass filter consisting of capacitor C11, C12, and inductor L5.

20. Crystal Oscillator V9

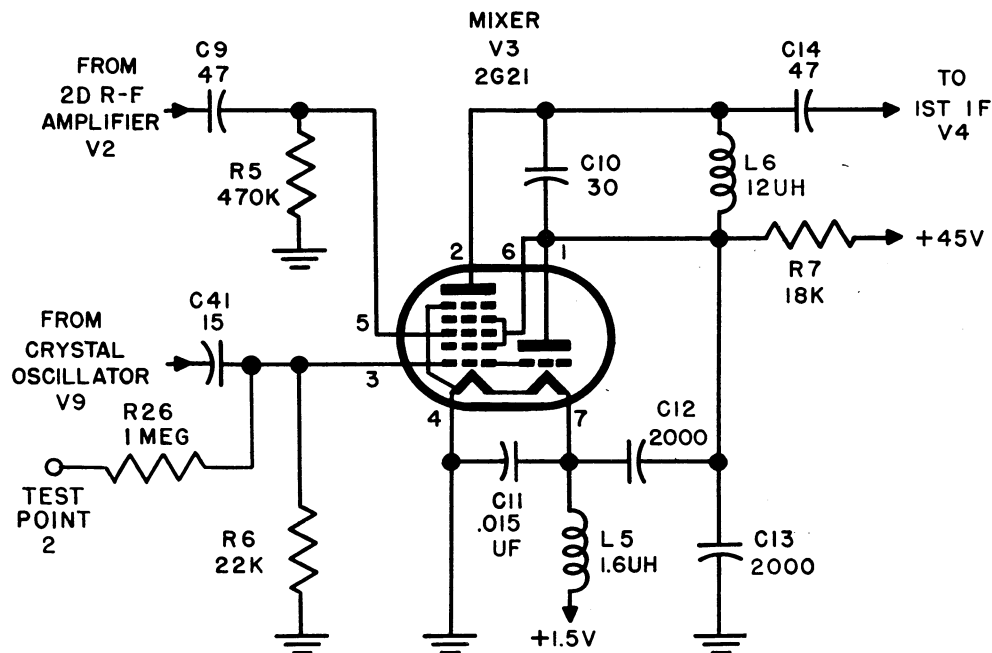
(fig. 14)

a. Crystal oscillator V9 is the h-f oscillator of the receiver, furnishing an input to the mixer stage that is 4.3 mc below the frequency of the incoming signal. The frequency of the transmitter is locked to the frequency of this stage by the afc loop (par. 24g).

b. Basically, this stage is a tuned-grid, tuned-plate oscillator with the crystal functioning as

the tuned circuit for the grid. The complete tuned-grid circuit consists of the crystal, inductor L16, and the input capacity of the tube. D-c ground return is provided by resistor R28. The tuned-plate circuit consists of capacitor C42 and variable inductor L15. In effect, the tuned grid, tuned-plate oscillator is a high-gain r-f amplifier that regenerates or oscillates because of feedback between the plate and grid circuit. The feedback is provided by the inter-electrode capacitances. To provide maximum capacity between the plate and grid, the tube is triode connected.

c. Plate supply decoupling is provided by resistor R27 and capacitor C43. Filament supply decoupling is provided by inductor L17 and capacitor C44. The output of the oscillator is



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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

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Figure 13. Radio Set AN/PRC-6, simplified schematic of mixer stage.

coupled to the mixer stage by capacitor C41. Since the crystal operates at or very near crystal resonance, inductor L16, is necessary to provide the required inductive reactance between grid and plate of V9.

21. 1st I-f Amplifier V4 (fig. 15)

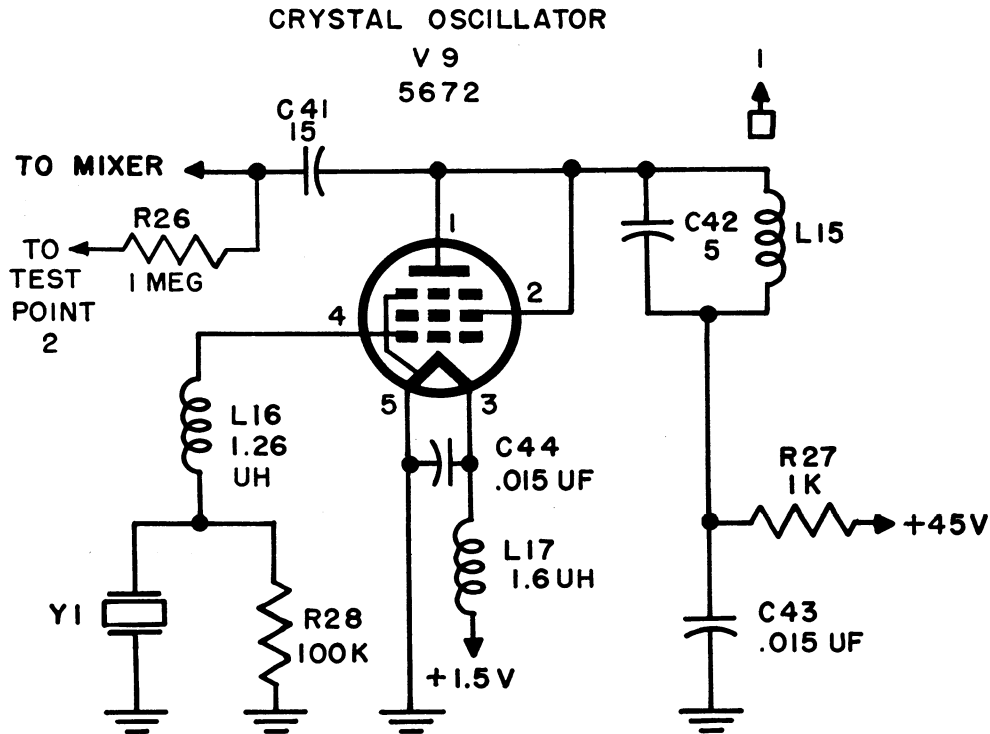
a. The intermediate frequency (4.3 mc), developed in the output of the mixer is coupled to i-f amplifier V4, amplified, and applied to 2d i-f amplifier V5. Since the plate load is a tuned circuit resonated to 4.3 mc, further discrimination against the undesired output frequencies of the mixer occurs.

b. The 4.3 mc output of this stage is developed across the parallel-resonant circuit consisting of capacitor C16 and inductor L8 and is coupled to 2d i-f amplifier V5 by capacitor C18. Inductor L8 is variable (slug-tuned) and is set to

resonate at 4.3 mc in conjunction with capacitor C16 and the distributed capacity of the circuit. C14 and R8 are the coupling capacitor and grid resistor, respectively.

c. Power supply decoupling for this stage is provided by resistor R9 and capacitor C17. Capacitor C17 also bypasses the screen. Inductor L7 and capacitor C15 form a low-pass filter to decouple the filament power supply.

d. Switch S1 in the filament circuit is opened during alinement of the equipment. Opening the switch disables the 1st i-f amplifier and reduces the gain of the equipment. With full i-f gain, there are a number of transmitter oscillator settings that give normal afc action. The gain must be reduced during alinement so that only the strongest (and therefore the correct) afc voltage is detected at test point 4. When the switch is open, the interelectrode capacity within the tube is sufficient to couple the i-f signal from the input to the output of this stage.



TM 4069-14

Figure 14. Radio Set AN/PRC-6, simplified schematic of crystal oscillator stage.

22. I-f Amplifiers V5 and V6

(fig. 16)

a. V5 and V6 are capacity-coupled, tuned i-f amplifiers that provide additional gain and selectivity. Circuit-wise, they are identical in every respect. In the description that follows, the components associated with V6 are shown in parentheses.

b. The grid circuit consists of capacitor C18 (C22) and resistor R10 (R12). C22 (C26) provides capacity coupling to the next stage. The plate load is the tank circuit consisting of capacitor C20 (C24) and inductor L11 (L13). Capacitor C19 (C23) and inductor L9 (L12) provide filament power supply decoupling. B+ power supply decoupling is provided by capacitor C21 (C25) also acts as the screen bypass

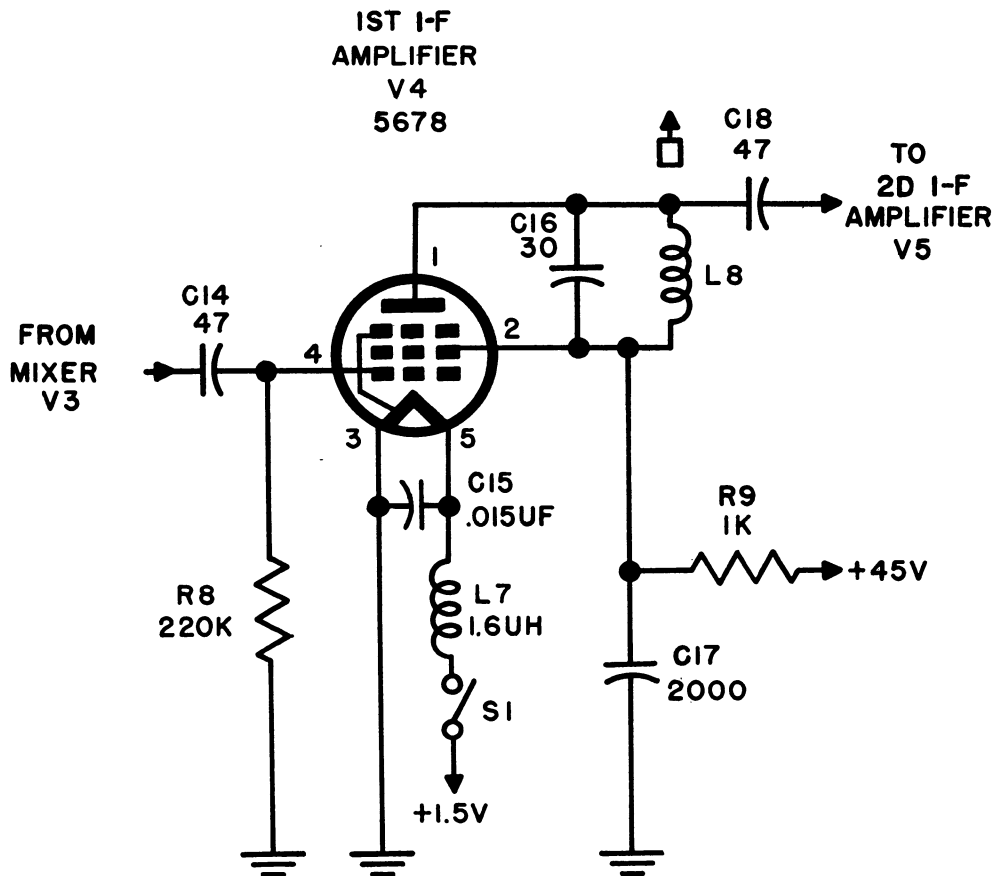
capacitor. The output of 3d i-f amplifier V6 is coupled to the limiter by capacitor C26.

c. Since the over-all gain of the three i-f amplifiers is very high, special design is required to eliminate coupling between the input of the 1st i-f amplifier and the output of the 3d i-f amplifier. Capacitive coupling between circuit components is reduced by constructing each circuit in its own shielded compartment. Coupling through the common +45-volt B+ supply is reduced by inductor L10 (fig. 30) functioning as a choke.

23. Limiter V7

(fig. 17)

a. Limiter V7 eliminates amplitude variations in the i-f signal and delivers a constant



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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

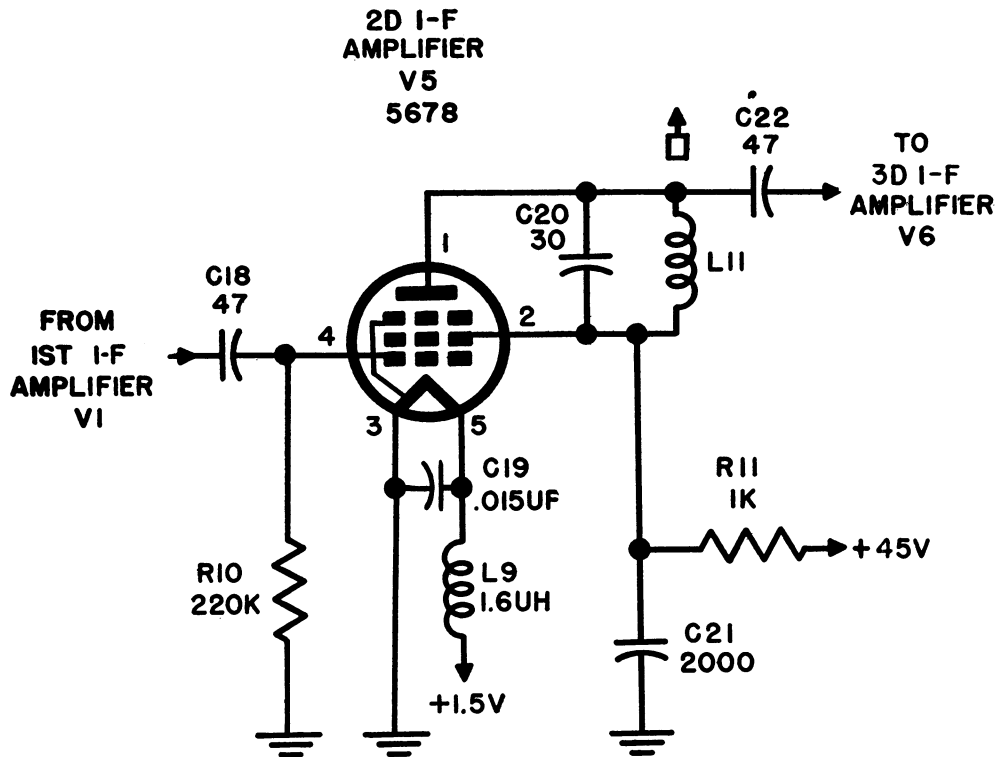
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Figure 15. Radio Set AN/PRC-6, simplified schematic of 1st i-f amplifier stage.

amplitude f-m signal to the discriminator. Since most of the noise originating in the atmosphere and in the input of the r-f amplifier causes amplitude variations of the signal, limiting reduces the audible noise output of the receiver without affecting the intelligence carried by the f-m signal. The limiting action occurs in the grid circuit of V7.

b. The output from the 3d i-f amplifier, which is applied to the control grid of V7, is relatively large in amplitude. The peak amplitudes of the signal extend over a greater voltage range than the usable dynamic range of the limiter grid circuit. As a result, the positive excursions of

the signal cause V7 to draw grid current and the negative pluses drive the tube beyond cut-off. Thus, both the positive and negative portions of the signal are clipped. As a result of grid current flow, the grid-leak combination consisting of capacitor C26 and resistor R15 develops bias for V7; the level of bias developed depends on the amplitude of signal drive. Therefore, the bias at the control grid is an indication of i-f drive and is used in aligning the i-f amplifiers. The i-f amplifiers are tuned properly when the grid voltage of V7 is maximum. Resistor R14 connects the grid to test point 3 of J2 to permit the voltage, which is developed



NOTE:
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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

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Figure 16. Radio Set AN/PRC-6, simplified schematic of 2d i-f amplifier stage.

across resistor R15 by grid current, to be measured. Capacitor C27 and resistor R14 form an i-f filter, eliminating the 4.3-mc component from the test voltage applied to test point 3 of J2.

c. The grid-limited signal is amplified by the tube and appears in the plate circuit. The plate load for the limiter is the primary of transformer T1 in parallel with capacitor C29. Transformer T1 provides inductive coupling to the discriminator circuit.

d. Plate supply decoupling for this stage is provided by resistor R17 and capacitor C32. Screen decoupling is provided by R16 and C30. Filament power supply decoupling is accom-

plished by the low-pass filter consisting of capacitor C28 and inductor L14.

24. Discriminator Circuit

(figs. 18 and 19)

a. The function of the discriminator circuit is to convert the frequency variations of the i-f signals into amplitude variations. The audio signal corresponding to these amplitude variations then is amplified and is used to energize an earphone. In addition to the audio output, another output, taken from the discriminator, controls the afc circuit. The discriminator circuit consists of transformer T1, crystal rectifiers CR1 and CR2, and associated components.

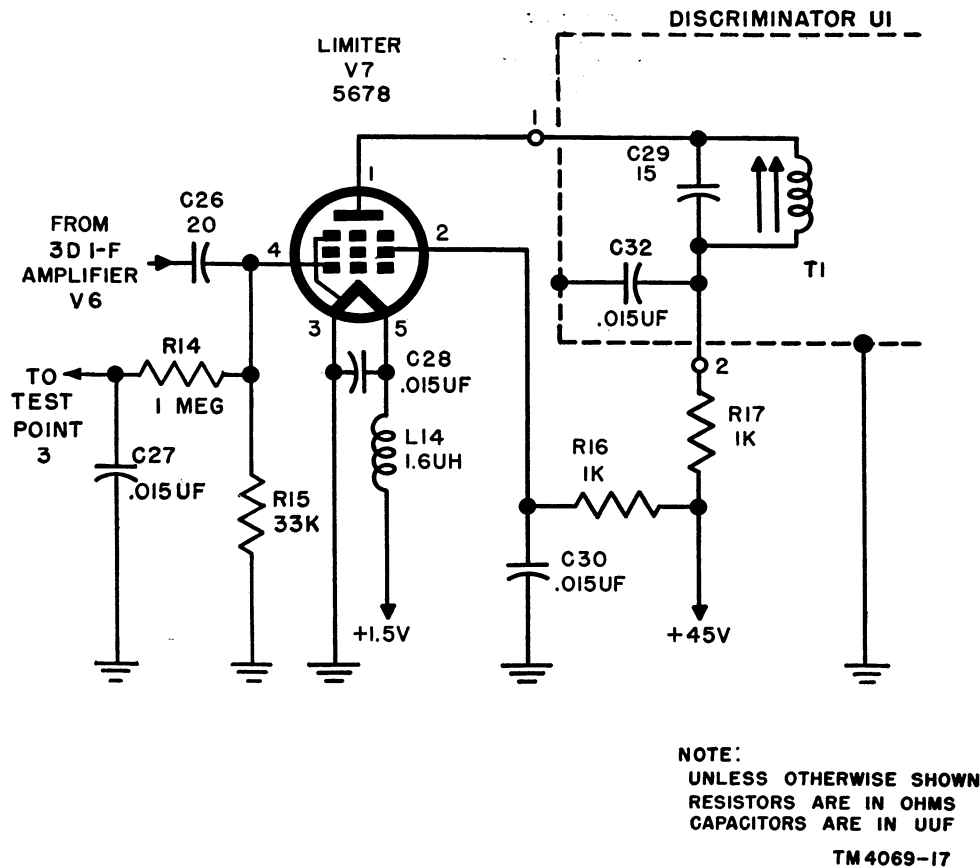


Figure 17. Radio Set AN/PRC-6, simplified schematic of limiter stage.

b. The primary and secondary of transformer T1 are both resonated to 4.3 mc; the primary by capacitor C29 and the secondary by capacitor C33. Coupling between the primary and secondary is inductive through T1 and capacitive through capacitor C31. The primary and secondary windings are arranged so that the primary voltage (e_p) and the induced secondary voltage (e_s) are in phase. The phase of the secondary current, however, depends on the secondary impedance which consists of the series impedance of C33 and the secondary winding. When the secondary is resonated to 4.3 mc, the impedance is purely resistive. Thus the current flowing in the secondary is in phase with the induced voltage. In A of figure 19, the primary voltage (e_p), the induced secondary voltage (e_s), and the secondary current (i_s) are vectorially represented. Since e_p , e_s , and i_s are in phase, the vectors representing them are all in the same direction. When the secondary current (i_s) flows through the secondary winding,

the voltage (e_L) developed across the inductance leads the current (i_s) by 90° (B of fig. 19). The voltage e_L , should not be confused with e_s , which represents the induced secondary voltage. The induced secondary voltage, e_s , is considered as a generator acting within the secondary winding. The voltage e_L is equal to the sum of the voltages developed across each half of the tapped secondary. This is shown in B of figure 19 where e_L is shown to be the vector sum of $\frac{1}{2}e_L$ plus $\frac{1}{2}e_L$. In C of figure 19, the half of e_L developed across the top half of the tapped secondary is designated e_1 ; that across the bottom half is designated e_2 . The total voltage in the top half of the secondary (e_{CR1}) is half the vector sum of the induced voltage, e_1 , plus the primary voltage (e_p) capacitively coupled to the center tap by C31. This is illustrated in C of figure 19. (Because of the value of C31, the reactive drop across it at 4.3 mc is negligible.) The total voltage at the bottom half of the secondary (e_{CR2}) is obtained by a

similar vector addition. In this case, however, the negative of e_2 is added to e_p , since the direction of electron flow is in the opposite direction of e_1 . This means that the two voltages are out of phase.

c. As long as the input frequency remains at 4.3 mc, the voltages applied across crystal rectifiers CR1 and CR2 remain equal. Crystal rectifier CR1 and its load resistor, R18, and crystal rectifier CR2 and its load resistor, R19, are conventional amplitude detectors. Both detector circuits are arranged so that electron flow in the load resistors is away from their common junction, thereby developing opposing voltages. C34 and C35 provide an i-f return to ground. When the voltages applied to CR1 and CR2 are equal, equal and opposite potentials are developed across resistors R18 and R19. No difference of potential then exists across the combined load resistors, and no output signal is applied to audio amplifier V8. The connection between the junction of R18 and R19 and the secondary center tap provides a return path for electron flow through the resistors.

d. When the input signal frequency differs from 4.3 mc, e_{CR1} and e_{CR2} are no longer equal. Assume that the input frequency is below 4.3 mc. The impedance of the tuned secondary now contains a capacitive reactive component. The capacitive reactance causes the current flow (i_s) in the tuned secondary to lead the induced voltage (e_s). This is vectorially represented in D of figure 19. When this current flows through the inductance of the secondary, the voltage (e_L) developed across the transformer secondary leads the current by 90° . Vector representations of the relations are shown in D of figure 19. The total voltage developed across the inductance is still the sum of the voltages developed across each half of the tapped secondary. To determine the total potential across CR1, e_1 is vectorially added to e_p ; to determine the voltage across CR2, e_2 is vectorially added to e_p (E of fig. 19). The vector sums e_{CR1} and e_{CR2} are not equal, e_{CR2} being greater. Consequently, the potential developed across resistor R19 is greater than potential developed across resistor R18 and a signal is coupled to the audio amplifier.

e. As the frequency deviation from 4.3 mc increases, the potential difference increases;

the polarity of the voltage difference depending on the direction of the frequency deviation. See F of figure 19 for the conditions that exist when the input frequency is above 4.3 mc. Since the frequency variations of the signal occur at an audio rate, the voltage output varies at an audio rate. This a-f (audio-frequency) voltage variation is the output signal of the discriminator.

f. The audio signal developed across resistors R18 and R19 is applied to audio amplifier V8 through a filter. Capacitor C34 eliminates any 4.3-mc component from the audio signal. Resistor R21 and capacitor C36 de-emphasize the higher audio frequencies which were pre-emphasized in the transmitter (par. 13c). C36 offers a higher impedance to the lower audio frequencies than to the higher audio frequencies. As a result, the division of the audio signal voltage between R2 and C36 is such that more audio voltage appears across C36 at the lower audio frequencies than at the higher audio frequencies. The deemphasized audio signal from the filter is coupled to audio amplifier V8 by capacitor C39.

g. An afc signal voltage that corrects the frequency of the transmitter in the event of oscillator frequency drift is also developed by the discriminator circuit. During transmission, part of the transmitter output enters the receiver (par. 17b). The transmitter signal is amplified in the r-f amplifiers, beat against the crystal oscillator signal in the mixer, applied to and amplified by the i-f amplifiers, and then is coupled to the discriminator circuit. When the transmitter frequency is exactly 4.3 mc above the crystal oscillator frequency, the frequency of the i-f signal applied to the discriminator is 4.3 mc and no output voltage is generated. If the transmitter frequency drifts, the i-f signal applied to the discriminator is no longer 4.3 mc, and the discriminator generates a voltage with an amplitude which corresponds to the amount of frequency deviation and with a polarity which indicates whether the intermediate frequency has shifted above or below 4.3 mc. This voltage is filtered and smoothed and is applied to the modulator which shifts the transmitter output frequency until the i-f signal reaching the discriminator is 4.3 mc. Since the 4.3 mc i-f signal is produced by beat-

ing the transmitter signal against the crystal oscillator signal, the output frequency of the transmitter is crystal-controlled.

h. The afc voltage appearing across C36 is applied to the two-section, low-pass filter, which is composed of capacitors C37 and C38 and resistors R22 and R23. This filter removes any audio component from the afc voltage. Only the d-c voltage, caused by the transmitter frequency drift, appears across C38. This d-c voltage is applied as a corrective bias to the modulator (fig. 7). Fixed bias for the modulator tube is coupled through resistors R20, R19, R18, and R21 and the low-pass filter to the modulator grid. The afc voltage is in series with this -4.5-volt bias voltage and therefore modifies the modulator grid bias; as a result, the modulator plate current.

potentiometer R33. The audio signal is amplified by the tube and the output is developed across the primary of the audio transformer in T2. Capacitor C40 bypasses audio variations around the 45-volt supply.

b. The audio transformer is part of transformer assembly T2; the microphone transformer which is also part of T2 functions independently of the audio transformer. The audio transformer inductively couples the output of the audio amplifier to the earphone and matches the impedance of the audio amplifier plate circuit to the impedance of the earphone. The desired volume is controlled by VOLUME control R33.

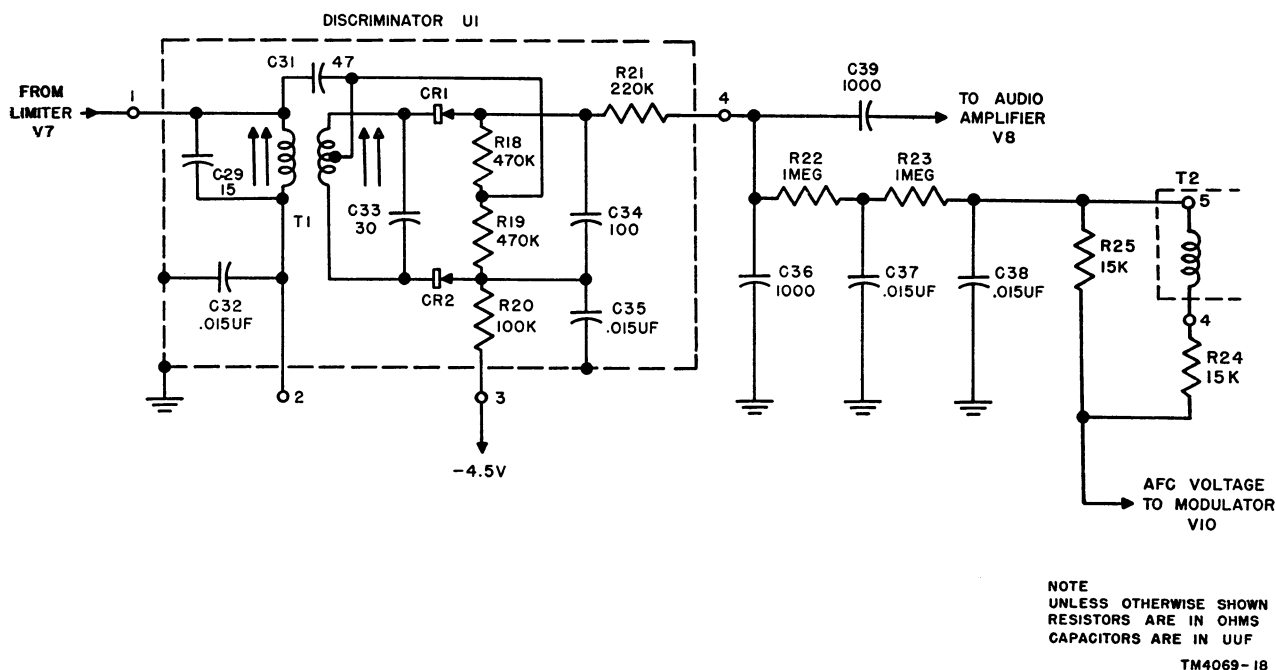


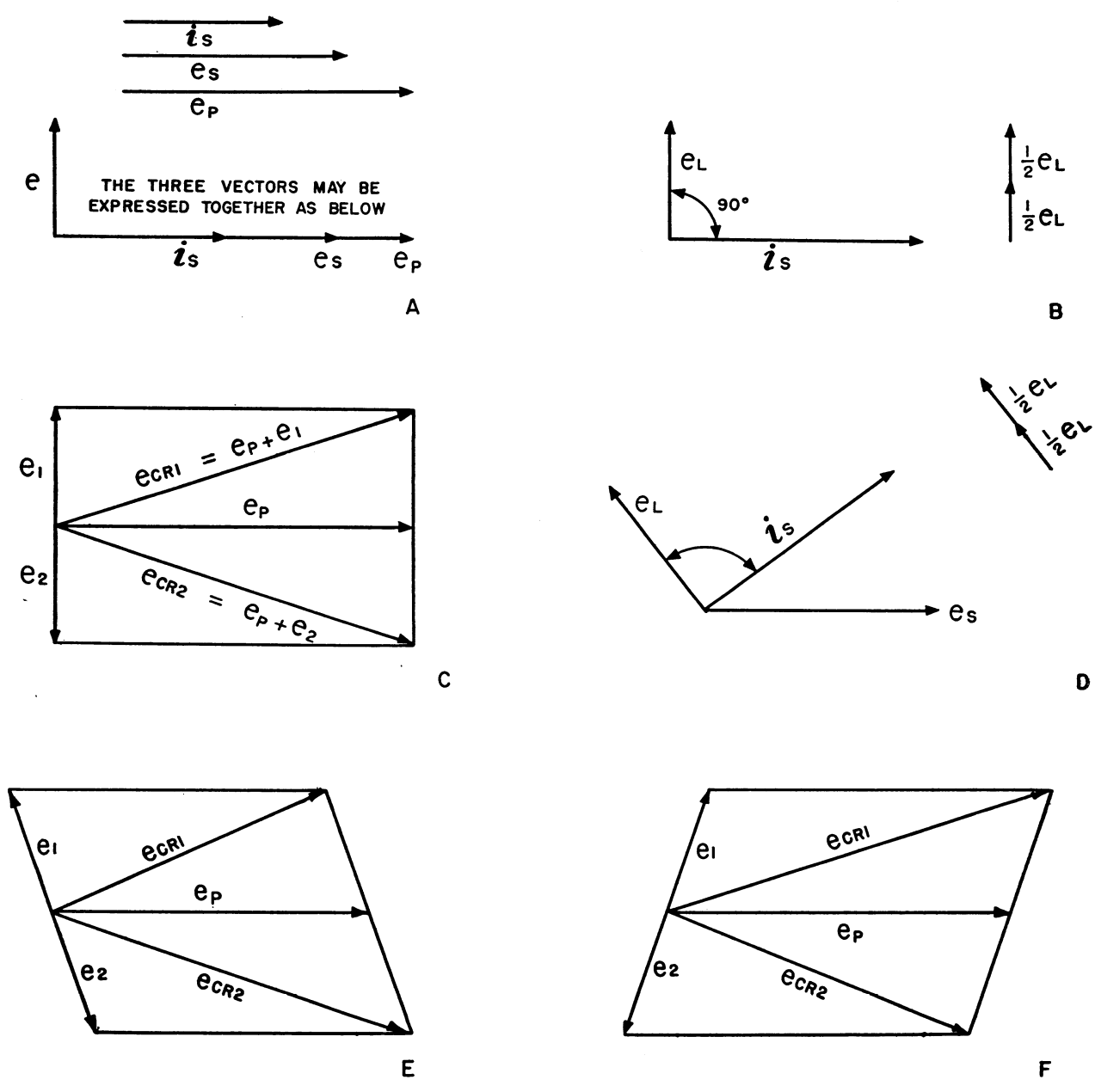
Figure 18. Radio Set AN/PRC-6, simplified schematic of discriminator circuit. (In some equipments, C33 consists of a 20- μ f capacitor and a 10- μ f capacitor connected in parallel.)

25. Audio Amplifier V8 (fig. 20)

a. The audio stage amplifies the audio output of the discriminator to provide sufficient power to drive the earphone. Bias voltage obtained from the bias section of the battery is applied to the grid through resistor R34 and VOLUME

26. Control Circuits (fig. 21)

a. General. The control circuits of this equipment include two switches, the EXT.-OFF-INT. switch and the PUSH-TO-TALK switch (either the one on the case or the one in Handset H-33(*)/PT.) These switches, in addition to



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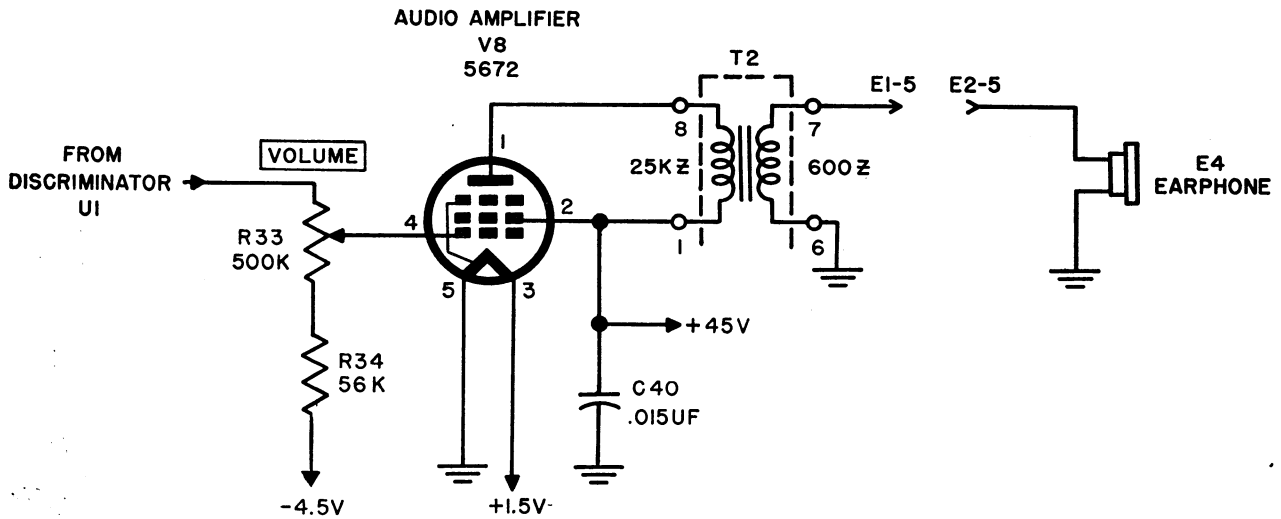
Figure 19. Discriminator circuit, vector analysis.

functioning as power on-off controls, also determine whether the equipment will function as a transmitter or receiver and whether the handset or the microphone and earphone on the case are in the circuits.

b. *EXT.-OFF-INT. Switch in Off Position.* The equipment is completely disabled. The negative leads of the 1.5-volt filament and 45- and

90-volt B+ supplies are not grounded. The 4.5-volt bias is applied to the grids of V8 and V10.

- c. *EXT.-OFF-INT. Switch in Int. Position.*
 - (1) The receiver 1.5- and 45-volt circuits are completely energized by grounding the negative battery leads through the EXT.-OFF-INT. switch. Ear-



NOTE:
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RESISTORS ARE IN OHMS
CAPACITORS ARE IN UUF

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Figure 20. Radio Set AN/PRC-6, simplified schematic of audio amplifier stage.

phone E4 on the case is connected across the secondary of T2. The transmitter 90-volt B+ supply also is completed through the EXT.-OFF-INT. switch, but the filaments of transmitter tubes V11, V12, and V13 are not energized.

- (2) When PUSH-TO-TALK switch S2 on the case is depressed, the transmitter filament circuits are completed through this switch, and the circuit of the microphone on the case is completed through the primary of T2, microphone E3, and the INT. contacts of the EXT.-OFF-INT. switch.
- (3) When the PUSH-TO-TALK switch on the handset is depressed, the results are as described in (2) above, since the PUSH-TO-TALK switches of the case and handset are in parallel.

d. *EXT.-OFF-INT. Switch in the Ext. Position.* In this position, the EXT.-OFF-INT. switch completes the receiver 1.5- and 45-volt circuits, the transmitter 90-volt B+ circuits,

and connects the handset earphone into the receiver circuits.

- (1) When the PUSH-TO-TALK switch on the case is depressed, the transmitter filament circuits are completed through this switch. Transmission is not possible since the microphone circuits are not completed.
- (2) When the PUSH-TO-TALK switch on the handset is depressed, the transmitter filament circuits are completed through this switch, and the handset microphone circuit is completed through the EXT.-OFF-INT. and the PUSH-TO-TALK switches.

27. Handset H-33 (*) /PT

Handset H-33(*)/PT contains a conventional electromagnetic earphone and a single-button carbon microphone that are duplicates of those contained in Receiver-Transmitter RT-196/PRC-6. The PUSH-TO-TALK switch functions and is electrically identical to the one in the case.

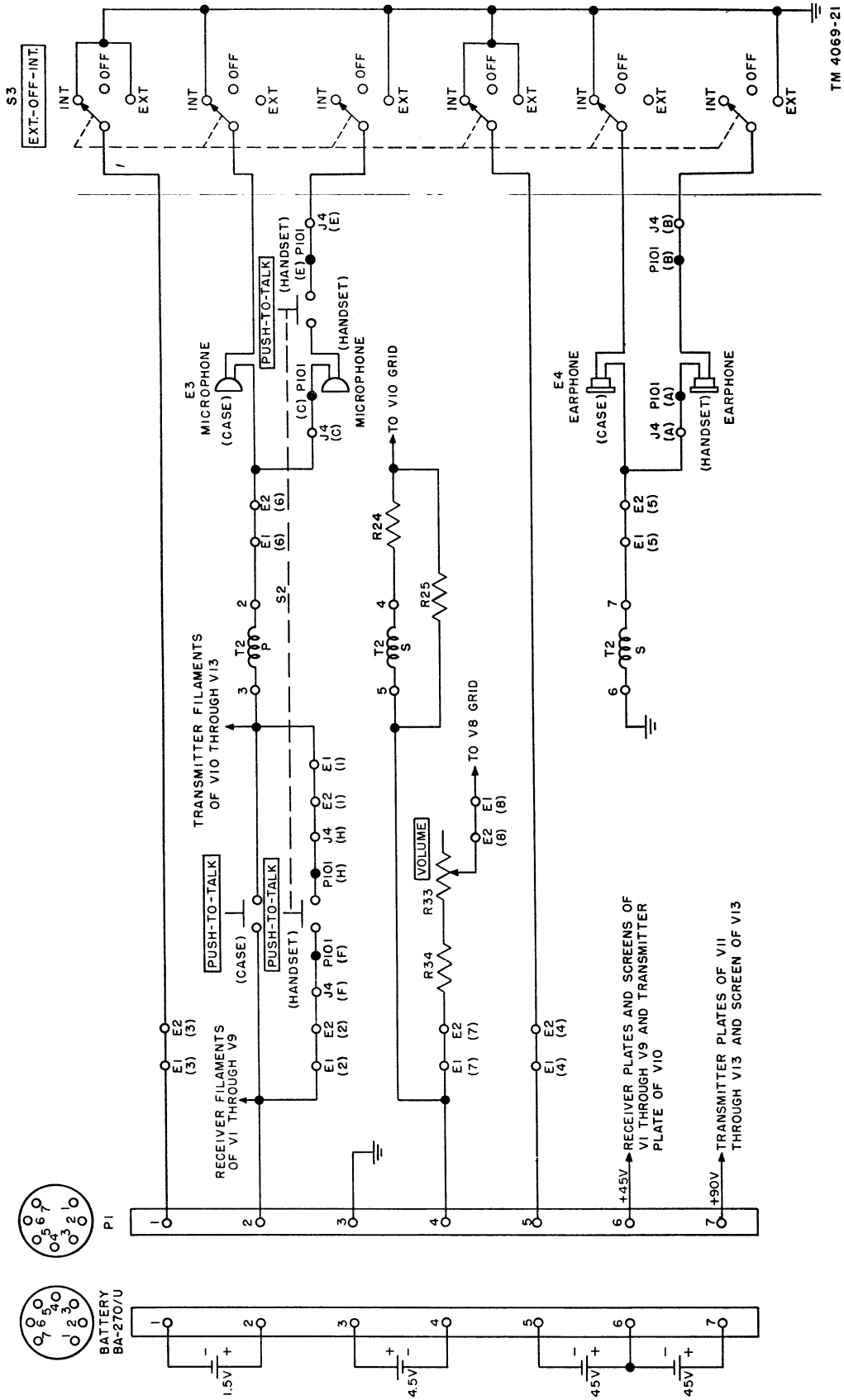


Figure 21. Radio Set AN/PRC-6, control circuit diagram.

CHAPTER 3

TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

Section I. TROUBLE-SHOOTING PROCEDURES

28. General

The first step in servicing a defective radio set is to sectionalize the fault. Sectionalization means tracing the fault to the circuit responsible for the abnormal operation of the set. The second step is to localize the fault. Localization means tracing the fault to the defective part responsible for the abnormal condition. Some faults, such as burned-out resistors, r-f arcing, and shorted transformers, can often be located by sight, smell, or hearing. The majority of faults, however, must be localized by checking voltage and resistance.

29. Component Sectionalization and Localization

The tests listed below are an aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. Remember that the servicing procedure should cause no further damage to the equipment. First, trouble should be localized to a single stage or circuit. Then the trouble may be isolated within that stage or circuit by appropriate voltage, resistance, and continuity measurements. The service procedure is summarized as follows:

a. Visual Inspection. The purpose of visual inspection (par. 33) is to locate any visible trouble. Through this inspection alone, the repairman frequently may discover the trouble, or determine the stage in which the trouble exists. This inspection is valuable in avoiding additional damage to the receiver, which might

occur through improper servicing methods, and in forestalling future failures.

b. Input Resistance Measurements. These measurements (par. 34) prevent further damage to the equipment from possible short circuits. Since this test gives an indication of the condition of the input circuits, its function is more than preventive.

c. Operational Test. The operational test (par. 35) is important because it frequently indicates the *general* location of trouble. In many instances the information gained will determine the exact nature of the fault. In order to utilize this information fully, all symptoms must be interpreted in relation to one another.

d. Test-Point Localization. The readings given in paragraph 36 will further aid in localizing the faulty circuit and component.

e. Trouble-Shooting Chart. The trouble symptoms listed in this chart (par. 37) are further aids in localizing trouble.

f. Signal Substitution. The principal advantage of the signal substitution method (pars. 38 through 41) is that it usually enables the repairman to localize a trouble accurately and quickly to a given stage when the general location of the trouble is not immediately evident from the above tests.

g. Stage Gain Charts. These charts (par. 42) can be used to localize obscure, hard-to-find troubles.

h. Intermittents. In all these tests the possibility of intermittents should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the set.

Section II. TROUBLE-SHOOTING DATA AND EQUIPMENT

30. Trouble-Shooting Data

Take advantage of the material supplied in this manual. It will help in the rapid location of faults. Consult the following trouble-shooting data:

<i>Fig. or par. No.</i>	<i>Description</i>
Fig. 30	Radio Set AN/PRC-6, schematic diagram.
Fig. 24	Radio Set AN/PRC-6, wiring diagram and component layout.
Fig. 22	Radio Set AN/PRC-6, voltage and resistance diagram.
Par. 36	Test-point readings.
Fig. 23	Radio Set AN/PRC-6, chassis, top view.
Fig. 21	Radio Set AN/PRC-6, control circuit diagram.

31. Test Equipment Required for Trouble Shooting

The test equipment required for trouble shooting Radio Set AN/PRC-6 is listed below. The technical manuals associated with the test equipment are also listed.

<i>Test equipment</i>	<i>Technical manual</i>
Electronic Multimeter TS-505/U	TM 11-5511
Tube Tester I-177	TM 11-2627
Tube Socket Adapter Kit MX-949/U	TB 11-2627-2
Signal Generator Set AN/URM-27	TM 11-5522
Tool Equipment TE-41	
Tool Equipment TE-113	
Audio Oscillator TS-382A/U	TM 11-2684A
Signal Generator I-208	TM 11-317

Section III. TROUBLE SHOOTING

32. General Precautions

Whenever the equipment is serviced, observe the following precautions very carefully:

a. Do not use the battery that will go back with the equipment. The life of Battery BA-270/U is limited, and considerable power is consumed when the equipment is used for transmitting. Batteries of equipments returned for servicing should be tested and replaced if necessary.

b. The component parts of Radio Set AN/PRC-6 are mounted with a minimum of space between them. If the parts must be unsoldered or replaced, be careful not to place strain on the leads of other parts by pushing them out of the way, or to damage them by touching them with a hot soldering iron. Careless replacement of parts may introduce new faults. Follow the instructions in chapter 4. Note the following:

- (1) Before a part is unsoldered, record the position of the leads. If the part, such as a transformer, has a number of connections, tag each of the leads to it.
- (2) Do not allow drops of solder to fall into the set; they may cause short circuits.
- (3) A carelessly soldered connection may create a new fault. It is very important to make well soldered joints, since a poorly soldered joint is one of the most difficult faults to find.
- (4) When a part is replaced in r-f or i-f circuits, it must be placed exactly as the original one was. A part which

has the same electrical value but different physical size may cause trouble in h-f (high-frequency) circuits. Give particular attention to proper grounding when replacing a part. Use the same ground as in the original wiring. Failure to observe these precautions may result in decreased gain or possibly oscillation in the circuit.

- (5) The pins of the tubes used in this equipment are very close together. Therefore, when making measurements with the power applied, be very careful not to short the plate or screen pin to the filament. Even a momentary short will burn out the filament of every tube in the equipment if the PUSH-TO-TALK switch is depressed; or all the filaments of the tubes in the receiver circuits if it is not depressed.

33. Visual Inspection

a. Some troubles that may occur in the equipment can be discovered with a simple visual inspection of the interior. Open the case to perform this inspection.

b. When the case is opened, check to see that the cable plug is seated firmly in the receptacle in the top of the battery. Inspect the battery and make sure that no chemicals are leaking from it and that the case is not cracked. If the battery feels soft or spongy, replace it immediately.

c. Remove the thin aluminum shield over the chassis by pulling it upward. Check to see that the wire jumper (fig. 23) that connects pins 1 and 7 of the test jack, at the extreme lower right-hand corner of the chassis, is in place. The jumper consists of a short piece of wire shaped in the form of a U. Each leg of the U is approximately 1/4-inch long. Insert the jumper if necessary and replace the aluminum chassis shield.

d. Check to see that all wires coming from the chassis are intact and that the connections to the terminal strips are not broken.

e. Remove the tube guards and note the condition of the tubes. If any tube is suspected of being faulty, replace it. In inserting the new tube, make sure that the red dot on the base of the tube and the red dot on the tube socket are as close to each other as possible.

f. When the equipment fails, make a note of how the equipment performed immediately before failure. This information is very valuable.

34. Checking Key Circuits for Shorts

a. Before performing any servicing operations on equipment, the serviceman must check the resistances normally found at the pins of the battery plug. This check detects shorts in the B+, bias, or filament power circuits and avoids damage to the equipment.

b. The following tabulation indicates the resistances found at the pins of the battery plug of a normally functioning equipment. The resistances were measured with a VTVM (vacuum-tube voltmeter), such as Electronic Multimeter TS-505/U. The EXT.-OFF-INT. switch is in the INT. position. Resistances are given to ground. Resistances over 20 megohms are given as infinite.

Pin	Resistance
1	0
2	1.8 ohms
3	0
4	infinite
5	0
6	infinite
7	infinite

Caution: In checking filaments for continuity, set VTVM on RX10 range, or greater. This will avoid burning out filaments.

35. Operational Tests

After it has been determined that the equip-

ment will not be damaged further by operation, the next step in the trouble-shooting procedure is the operational test. The operational test is important because it will frequently indicate whether the trouble is in the transmitter circuits, receiver circuits, antenna, or battery. While performing the following tests, listen for any crackling or buzzing sounds which may indicate arcing in the equipment.

Caution: Open one of the lower latches before operating the equipment.

a. Snap the EXT.-OFF-INT. switch to the INT. position and listen for background noise. Complete lack of background noise indicates a defective component in the receiver circuits; very low background noise may indicate a weak battery or a weak tube. Replace the battery (par. 45). If the background noise is not restored to a normal level, corrective maintenance for the receiver circuits is indicated.

b. To isolate troubles to the transmitter circuits, hold down the PUSH-TO-TALK button. The background noise should disappear. Speak into the microphone. If the transmitter oscillator and modulator stages and the receiver are operating properly, the speech of the transmitted signal can be heard in the earphone. However, if the speech cannot be heard, and the receiver background noise is normal, corrective maintenance for the transmitter oscillator and modulator circuits is indicated. If the speech can be heard, and the equipment does not communicate over normal ranges, trouble in the doubler or power amplifier stages is indicated.

c. To check the condition of the antenna, perform the check described in a above with the antenna normal and then with the antenna grounded. The noise level with the antenna grounded should be reduced. If grounding the antenna does not reduce noise level, check the antenna circuit.

d. Connect the handset and turn the EXT.-OFF-INT. switch to the EXT. position. Perform the tests given in a and b above. If the equipment does not perform in the normal manner, check the handset and its connector.

36. Test-Point Localization

a. As a further aid in localizing the faulty circuit and component quickly, test jack J2

(fig. 23) is provided. In the chart that follows, the correct current or voltage to be found at each test point is given and the probable source of an incorrect reading indicated. To measure properly the voltages and currents at the test points of J2, a VTVM, such as Multimeter TS-505/U, or equal, should be used. The use of a VTVM is essential because of the high-impedance level of the circuits to which the test points are connected. A conventional multimeter would not indicate the correct values because of its relatively low internal impedance. Voltages are with respect to ground.

Note. Refer to paragraph 60b for the use of the adapter to fit J2.

b. Test points 1 and 7 are in series with the plate supply lead of power amplifier V13. By removing the jumper between them and inserting the positive lead of a milliammeter in test point 7 and the negative lead in test point 1, the plate current of the power amplifier can be measured. The PUSH-TO-TALK switch must be depressed during this measurement.

c. While checking the voltages at test points 2, 3, 4, and 5, the EXT.-OFF-INT. switch is placed in the INT. position. The PUSH-TO-TALK switch is *not* depressed. The PUSH-TO-TALK switch is depressed for the reading at test point 6.

Test point	Correct reading	Probable cause of incorrect reading
1 and 7 (refer to b above).	11 to 14 ma	Transmitter misaligned. Doubler, oscillator, or power amplifier stage defective. Weak battery.

Test point	Correct reading	Probable cause of incorrect reading
2	1 to 3 v	Crystal oscillator stage defective or misaligned. (Re-adjust counter 1.). If reading is 0, the mixer components are defective.
3	1 to 3 v	If reading at test point is normal, i-f stages are probably defective. If reading is 0, limiter V7 is probably defective. If reading is excessively high, i-f or r-f stages may be oscillating.
4	4.5 v	Weak battery. Defective component in discriminator.
5	1.5 v	Weak battery. Defective filament components.
6	12-22 v	Weak battery. Transmitter misaligned. Power amplifier, doubler, or oscillator stage defective.

37. Trouble-Shooting Chart

The following chart is supplied as an aid in locating trouble in the equipment. This chart lists the symptoms which the repairman observes, either visually or audibly, while making a few simple tests. The signal substitution tests outlined in paragraphs 38 through 41 can then be used to supplement this procedure and to determine the defective stage. Once the trouble has been localized to a stage or circuit, a tube check and voltage and resistance measurements of this stage or circuit should ordinarily be sufficient to isolate the defective part. Refer to figure 22 for normal voltage and resistance measurements.

Symptom	Probable trouble	Correction
1. Set is dead in both receive and transmit conditions.	1. Defective EX.-OFF-INT. switch. Weak battery ----- Dirty pin contacts on battery plug Battery cable defective ----- Earphone defective ----- Audio circuits inoperative -----	1. Replace switch. Replace battery. Clean pin contacts on battery plug. Check battery cable. Replace earphone. Check audio circuit and replace defective components.
2. Background noise, quieting,* but no sidetone.	2. Misalignment; microphone defective; modulator defective.	2. Realign equipment. Replace microphone; check modulator components.
3. Background noise, no quieting,* no sidetone.	3. Transmitter defective -----	3. Trouble shoot transmitter (par. 36c, first two items).

Symptom	Probable trouble	Correction
4. Background noise and sidetone, but no transmission or reception.	4. Antenna shorted -----	4. Correct any shorted antenna condition.
5. Background noise weak; sidetone normal; no reception or transmission.	5. Defective mixer tube V3 or crystal oscillator V9.	5. Check voltage at test point 2 of J2. If abnormal, replace crystal oscillator tube V9 and mixer V3, and perform receiver alinement.
6. No reception; transmitter circuit operative; background noise heard; sidetone weak.	6. Improper alinement ----- Defective tube in receiver ----- Defective receiver circuit element.	6. Aline receiver (ch. 5) ----- Replace tubes in receiver (par. 46), one by one, and check operation. Use signal tracing or signal substitution and make voltage and resistance checks to locate defective component.
7. No transmission, receiver circuit operative; receiver background normal.	7. Improper transmitter presetting-- Defective tube in transmitter circuit. Defective transmitter circuit element.	7. Aline the transmitter (ch. 5). Replace transmitter tubes and check operation. Check power amplifier plate current and grid drive. Make voltage and resistance measurements to locate defective component. Replace.
8. Poor sensitivity -----	8. Misalinement ----- Weak tubes or battery -----	8. Correct the presetting of both transmitter and receiver. Trouble shoot receiver. Replace battery. Replace tubes in receiver, one by one, and check operation.
9. Reception distorted -----	9. Open grid resistor or leaky capacitor in audio circuit; misalinement of receiver.	9. Replace C39 with capacitor known to be good. If signal does not return to normal, turn VOL-UME control fully clockwise, and shunt R33 with 500K resistor. If reception returns to normal, replace R33; otherwise replace V8.

* Reduced background noise when push-to-talk button is pressed.

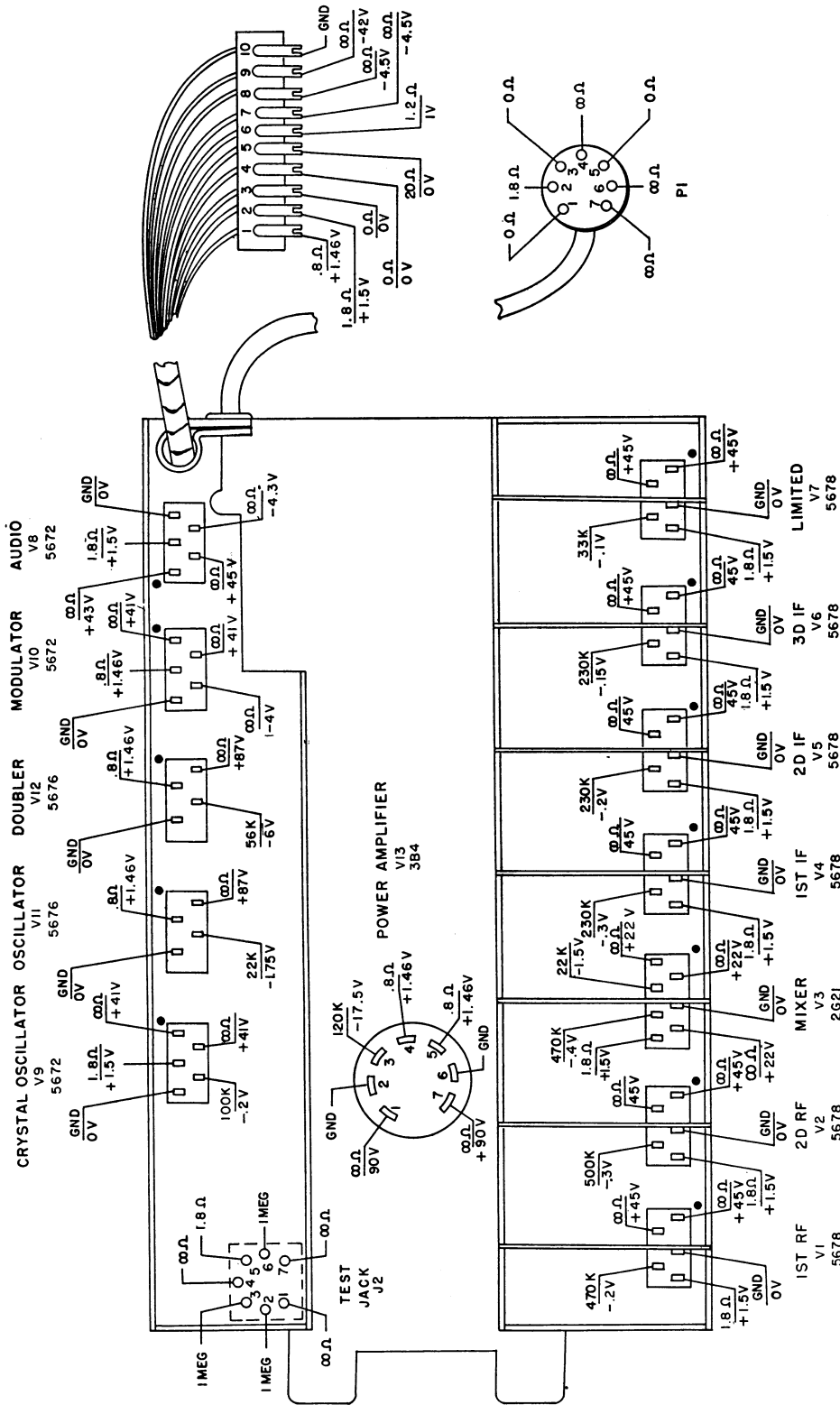
38. Signal Substitution Procedures

a. Signal substitution is a servicing technique which accomplishes sectionalization by using a signal generator to simulate normal signal conditions. This procedure requires signal generators capable of supplying audio signals, and f-m signals at the intermediate frequency of 4.3 mc and over the r-f range of 47 to 55.4 mc. Signal substitution for the transmitter circuits is not feasible because of the high signal level present in the transmitter. Signal generators that can simulate the high voltages present in the transmitter are not readily available.

b. Because of the relatively high frequency of the r-f and i-f channels used in this equipment, the distributed capacity of even a burned-out tube will couple the test signal from the

input to the output of a stage. Therefore, do not assume that because a signal is coupled through a stage, the stage is functioning properly. The repairman can avoid this mistake by remembering that the purpose of most of the stages in this equipment is to amplify a signal. Thus, a stage which provides no gain (except for the discriminator circuit and the modulator) should be checked by voltage and resistance measurements before proceeding further.

c. The signal substitution tests described in the following paragraphs are performed from the top of the chassis. This means that the tube indicated in the text is removed and the signal from the signal generator is injected into the circuit through one of the tube socket pins. To be able to do this the signal probes of the signal generator must be modified. Terminate



- NOTES:
1. WHEN TAKING RESISTANCE MEASUREMENTS, BATTERY PLUG IS REMOVED FROM BATTERY AND EXT-OFF-INT. SWITCH IS PLACED IN INT. POSITION. VOLUME CONTROL IS MAXIMUM CLOCKWISE.
 2. ALL RESISTANCES MEASURED TO GROUND (TERMINAL NO. 10 ON TERMINAL STRIP IS RECOMMENDED).
 3. ALL READINGS TAKEN WITH VTVM.
 4. RESISTANCE READINGS OVER 50 MEGS GIVEN AS INFINITE. (∞)
 5. CONTROL POSITIONS SAME AS NOTE 1 FOR VOLTAGE MEASUREMENTS.
 6. ● SIGNIFIES RED DOT ON TUBE SOCKET.
PIN CLOSEST TO RED DOT IS PIN NO. 1
TYPICAL PIN NUMBERING IS AS SHOWN.



7. PUSH-TO-TALK SWITCH DEPRESSED FOR TRANSMITTER READINGS.
8. USE THE VTVM ON RANGE OF RX10 OR GREATER TO AVOID BURNING OUT TUBE FILAMENTS.

Figure 22. Radio Set AN/PRC-6, voltage and resistance diagram.

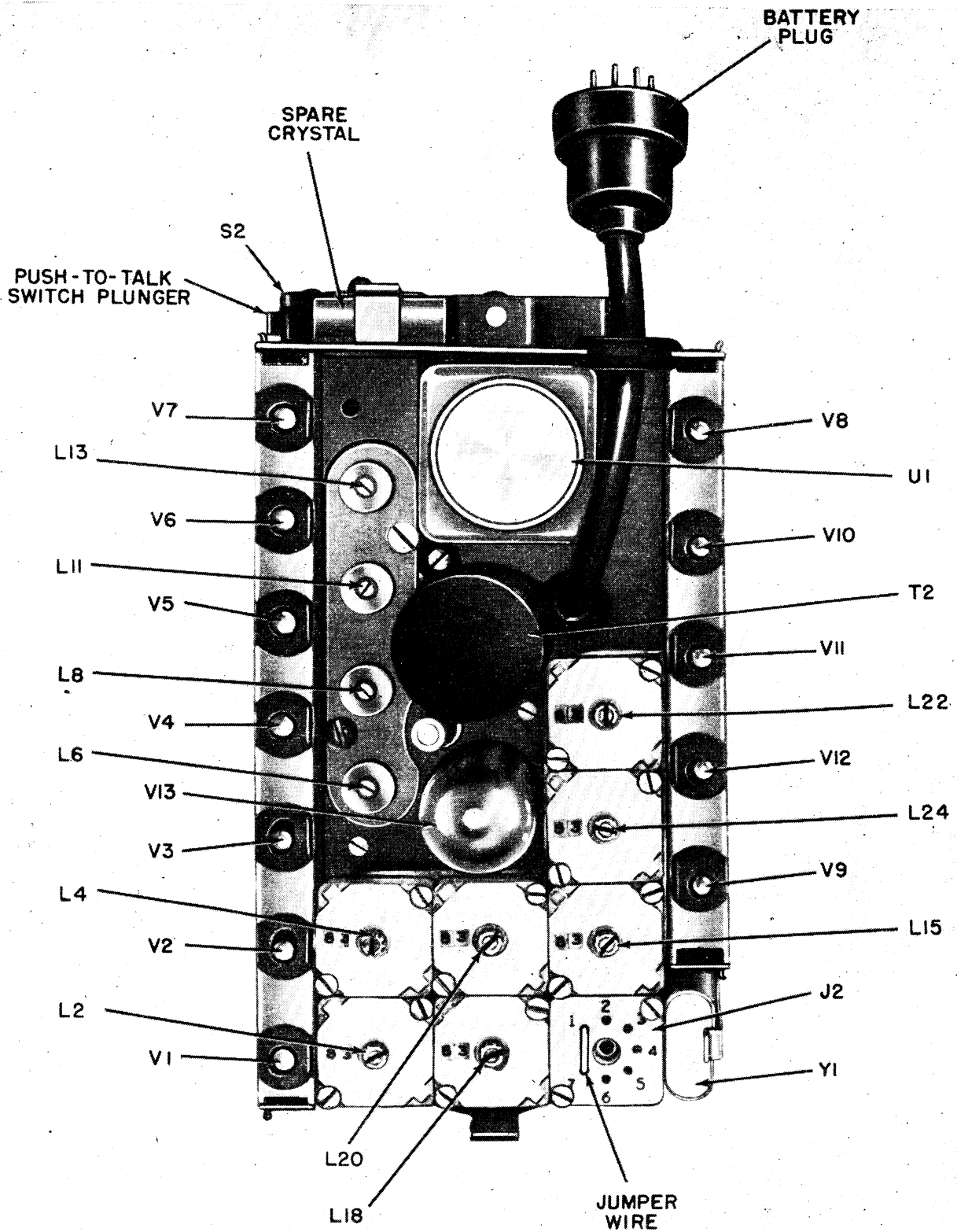


Figure 23. Radio Set AN/PRC-6, top view of chassis.

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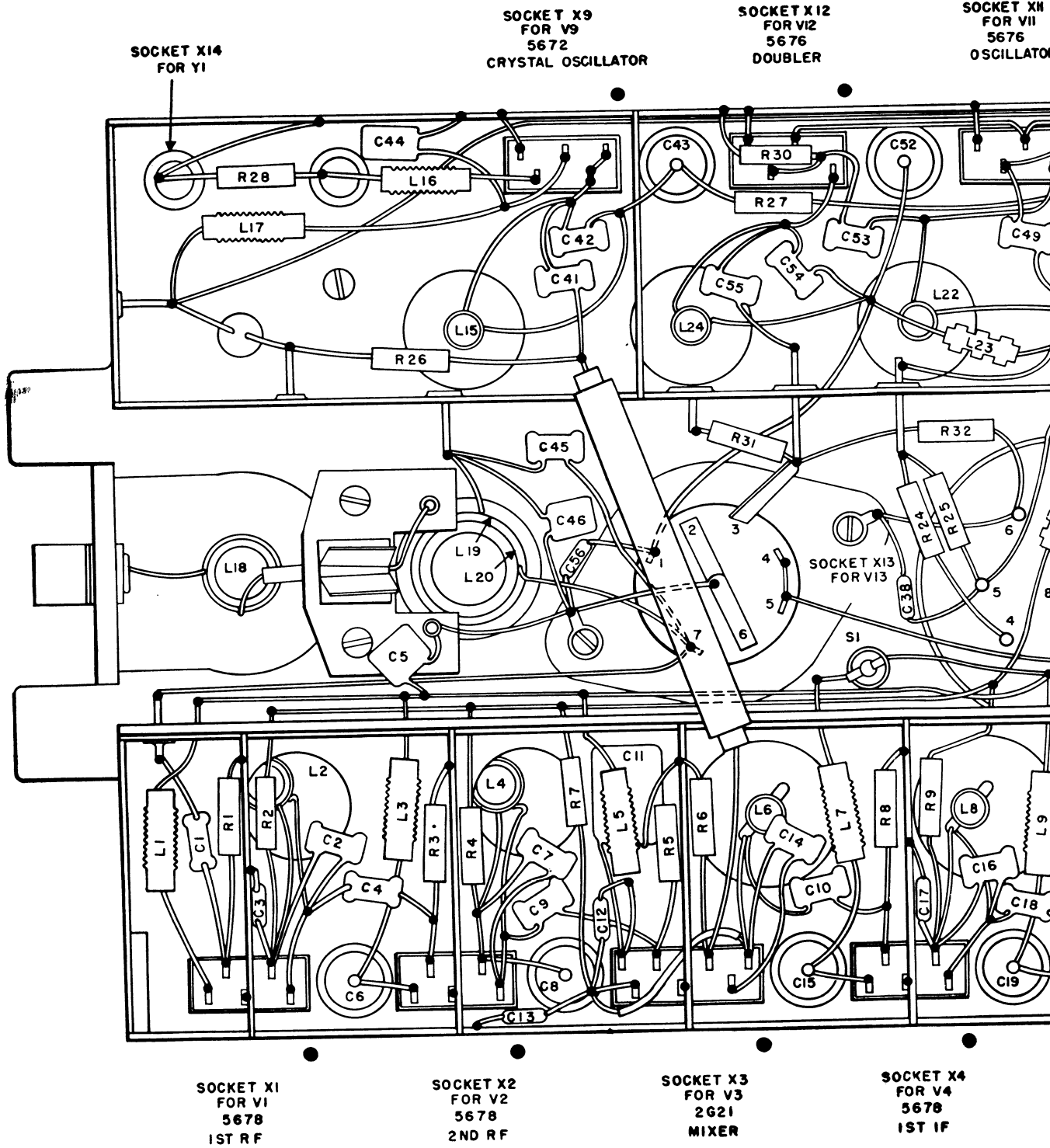


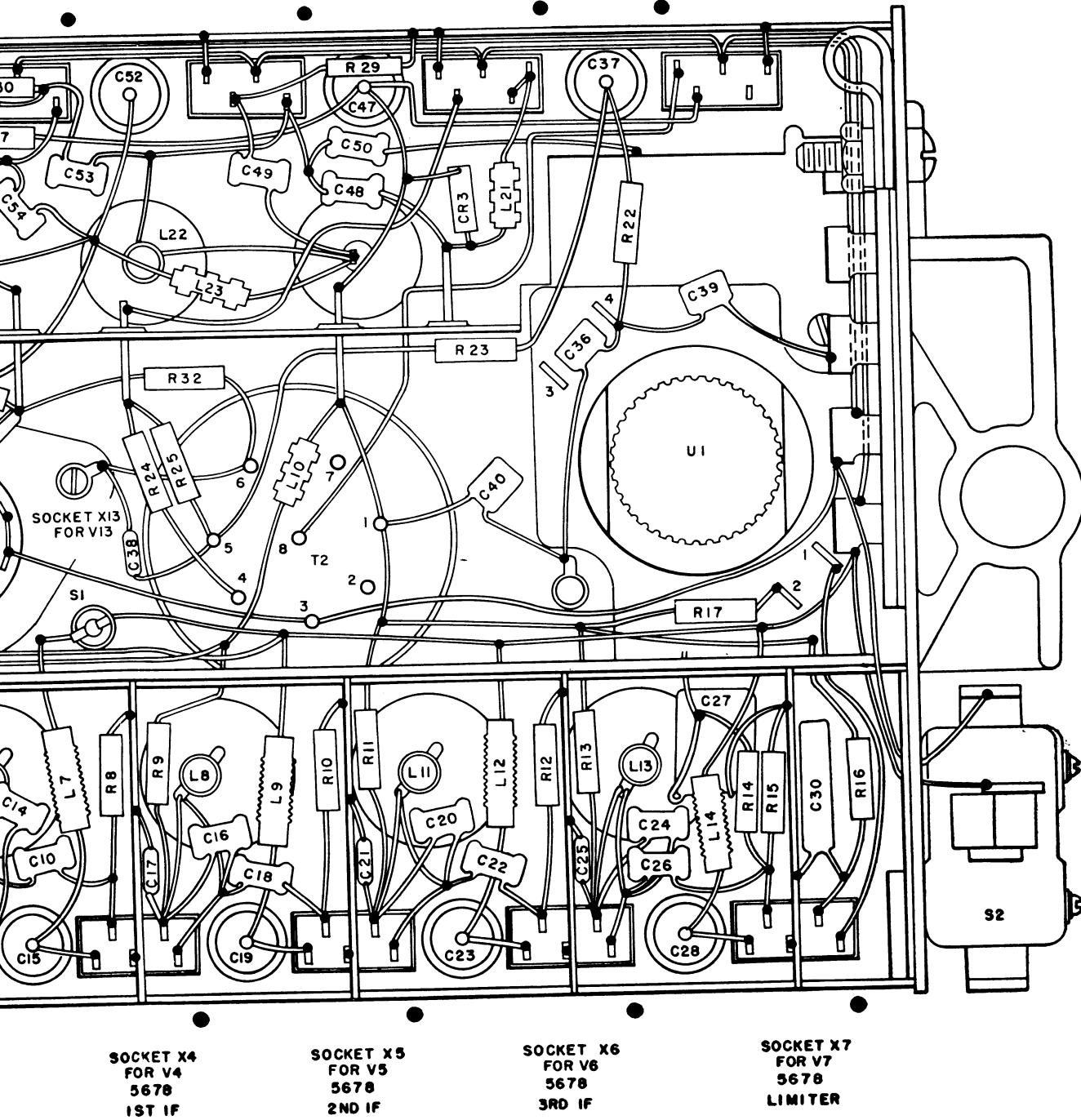
Figure 24. Radio Set AN/PRC-6, bottom view of chassis. (Source: [unclear])

SOCKET X12
FOR V12
5676
MIXER

SOCKET X11
FOR V11
5676
OSCILLATOR

SOCKET X10
FOR V10
5672
MODULATOR

SOCKET X8
FOR V8
5672
AUDIO



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C-6, bottom view of chassis. (Some equipments do not have C56.)

the hot lead with a .01- μ f (microfarad) capacitor (for d-c blocking purposes), and terminate the ground probe with a short length of #18 AWG solid copper wire. Insert the capacitor lead in the designated socket pin and insert the short piece of wire in the ground socket pin. When inserting the wire probes into the socket pins, be careful not to injure the delicate pin construction. Remove only *one* tube at a time when testing. Replace the tube after the test. Tube terminals can be located with the aid of figure 22.

d. At each step it is assumed that all previous steps were completed satisfactorily. Isolate and clear any trouble located before proceeding with succeeding steps.

e. For all the tests listed below, the EXT.-OFF-INT. switch is in the INT. position. To gain access to the tube sockets, follow the procedure in paragraph 46.

f. When working back from the output to the input stages, decrease the output of the signal generator as much as possible. If possible, compare with a receiver known to be in good condition.

39. A-f Signal Substitution Tests

a. *Terminal 1 of V8 (Plate of Audio Amplifier)*. This test checks the condition of the audio output transformer and the earphone. Apply an audio signal to pin 1 of V8. Listen for the audio tone of the signal generator in the earphone. The volume will be very low. If no signal is heard, place the EXT.-OFF-INT. switch in the EXT. position, connect Handset H-33(*)/PT to J4 and listen for the tone in the earphone of the handset. If the signal can be heard, the earphone in the case is defective. If the signal is still not audible, the continuity of T2 should be checked; the transformer is probably defective.

b. *Terminal 9 of Terminal Strip E1 (Input of Audio Amplifier)*. The purpose of this check is to determine the condition of the audio amplifier. Replace V8 and apply an audio signal to terminal 9 of E2 (terminal 10 can be used for the ground lead). An audio tone should be heard in the earphone. If no tone or a very low tone is heard, vary the position of the VOLUME control over its limits. If the volume level shifts suddenly as the control is varied, the potentiometer

may be defective. If changing the position of the VOLUME control has no audible effect, check the potentiometer and the audio output stage. Locate the faulty component by voltage and resistance measurements.

40. I-f Signal Substitution Tests

a. *Terminal 1 of V5 (Plate of 2d I-F Amplifier)*. This test can be used to check the functioning of the 3d i-f amplifier, the limiter, and the discriminator circuit. Apply an unmodulated signal with a frequency of 4.3 mc to terminal 1 of V5 (fig. 22) through the isolating capacitor. Increase the output amplitude of the signal generator to approximately 50,000 μ v. As the amplitude increases, the voltage measured at test point 3 should become more negative. If no voltage is measured at test point 3, compare the voltages found at the terminals of V6 and V7 with those shown in figure 22 to localize the trouble. Adjust the signal generator output until the voltage at test point 3 reads -5 volts. Then vary the output frequency of the signal generator 25 kc above and below the intermediate frequency (4.3 mc). The voltage at test point 4 should vary from approximately +6 to -6 volts, or higher, in absolute value. The difference between the absolute values of these readings should not be greater than 1 volt. Refer to paragraph 62 if the difference is more than 1 volt.

b. *Terminal 1 of V4 (Plate of 1st I-F Amplifier)*. This test is to check the functioning of the 2d i-f amplifier. Apply an unmodulated 4.3-mc signal through an isolating capacitor to terminal 1 of V4. A negative voltage should be found at test point 3. If the voltage at test point 3 is zero, a defective component in the 2d i-f amplifier circuit is indicated. To avoid spurious indications, keep the output amplitude of the signal generator below 5,000 μ v during this test.

c. *Terminal 1 of V3 (Plate of Mixer)*. This test is to check the condition of the 1st i-f amplifier. Apply an unmodulated signal with a frequency of 4.3 mc through the isolating capacitor to terminal 2 of V3. With an input signal of approximately 750 μ v, a negative voltage of approximately -.8 volt should be read at test point 3. During this test, the lead from the signal generator should be placed in a posi-

tion that minimizes capacitive coupling to the 2d or 3d i-f amplifiers. If voltage at test point 3 is too low, the 1st i-f amplifier should be checked for a defective component.

41. R-f Signal Substitution Tests

a. *Test Point 2 (Crystal Oscillator Output).* To check the crystal oscillator, measure the voltage at test point 2. It should read 1 to 3 volts negative. Corrective maintenance for this stage is indicated if this reading is not obtained.

b. *Terminal 1 of V2 (Plate of 2d R-f Amplifier).* To check the mixer, set the signal generator to the frequency of the receiver. Apply an unmodulated signal of approximately 320 μV through a .01- μf capacitor to terminal 1 of V2. Adjust the frequency of the signal generator for maximum negative reading at test point 3. A reading of approximately $-.8$ volt should be read at test point 3. If this reading is not obtained, corrective maintenance for the mixer is indicated.

c. *Terminal 1 of V1 (Plate of 1st R-f Amplifier).* The purpose of this test is to check the functioning of the 2d r-f amplifier. Apply an f-m signal with a frequency equal to the channel frequency to terminal 1 of V1 through the isolating capacitor. The amplitude of the signal should not exceed 100 μV . If the 2d r-f amplifier is operating properly, an audible tone will be heard in the earphone. Readjust the frequency of the signal generator if necessary. If the tone heard is very weak, check the components of the 2d r-f amplifier with voltage and resistance measurements.

d. *Antenna (Grid of 1st R-f Amplifier).* The purpose of this test is to check the functioning of the 1st r-f amplifier stage. Apply an f-m signal (of a frequency equal to the channel frequency) to the input of r-f amplifier by loosely wrapping the insulated portion of the test lead of the signal generator around the antenna of this equipment. A tone should be audible in the earphone. If no tone is heard or the tone is weak, check the antenna circuit and the components of the r-f amplifier.

42. Stage Gain Measurements

a. The stage gain chart (c below) lists the nominal input voltages (± 40 percent) required at each of the r-f and i-f stages of the receiver circuits of Radio Set AN/PRC-6 to develop a reference signal at test point 3 of J1. Use these

charts as standards when trouble shooting to check the over-all gain of the receiver and the gain of each r-f or i-f stage or group of stages. When the receiver gain is low, localize the defective stage by checking the signal voltage level of each stage against the chart while using the signal substitution method of trouble shooting, or by measuring individual stage gain. During stage gain test procedures, the EXT.-OFF-INT. switch is in the INT. position.

b. The stage gain checks are performed from the top of the chassis, using the pins of the tube sockets designated in the charts. Remove only *one* tube at a time when testing and replace it after the tests. The signal from the signal generator must be modified as follows: Terminate the hot probe with a .01- μf capacitor and terminate the ground probe with a short length of #18 AWG solid copper wire. During the tests, the capacitor lead is inserted into the designated socket pin and the short piece of wire is inserted into the ground socket pin. When inserting the wire probes into the socket pins, be careful not to injure the delicate pin construction.

c. The following measurements are made with a VTVM connected to test point 3.

- (1) *R-f stages: input frequency = 51.0 mc (receiver oscillator crystal Y1 = 46.7 mc).*

Point of signal injection	Signal level (μV)	Reference voltage at test point (3)
2d r-f amplifier plate, pin 1.	290	$-.8$ volt
1st r-f amplifier plate, pin 1.	40	$-.8$ volt
Power amplifier, pin 7.	12	$-.8$ volt
Coaxial antenna connector (whip antenna removed).	3	$-.8$ volt

Note. Because of wide variations of subminiature tube characteristics, these readings are nominal with a ± 40 percent tolerance.

- (2) *I-f stages: input frequency 4.3 mc (receiver oscillator-crystal removed).*

Point of signal injection	Signal level	Reference voltage at test point (3)
3d i-f amplifier plate, pin 1.	2 volts	$-.8$ volt
2d i-f amplifier plate, pin 1.	150,000 μV	$-.8$ volt
1st i-f amplifier plate, pin 1.	9,000 μV	$-.8$ volt
Mixer plate, pin 2.	750 μV	$-.8$ volt
2d r-f amplifier plate, pin 1.	320 μV	$-.8$ volt

Note. Because of wide variations of subminiature tube characteristics, these readings are nominal with a ± 40 percent tolerance.

CHAPTER 4

REPAIRS

43. Replacement of Parts

This chapter contains instructions for the removal and replacement of defective components. Because of the compact construction of Radio Set AN/PRC-6, care must be exercised when removing components to prevent damage to other components. Whenever a replacement requires the disconnection of numerous wires, a sketch of the connections and wire colors should be made. When space permits, tag the leads to be removed.

44. Method of Opening Case

Before any work can be done on the interior components of Radio Set AN/PRC-6, the case must be opened. The case is made of two sections held together by four lever-type latches, two on each side of the case. To release the latches, proceed as follows:

- a. Place the equipment with the microphone and earphone side face-down on a clean surface.
- b. Grasp a latch with the thumb and index finger and pull away from the case until the latch bends in the center and the finger tips are approximately 1 inch away from the case. Disengage the catch from the restraining hook.
- c. After releasing the four latches, separate the two portions of the case.

45. Replacing Battery BA-270/U

To replace the battery, proceed as follows:

- a. Open the case and unpack the battery from its container. Inspect for leakage or swelling. Place the battery in the compartment at the bottom of the case with the rounded side uppermost. Be sure to leave the plastic corrosion shield in place. It is not necessary that the

battery completely fill the compartment. In some cases, there may be as much as a quarter-inch separation between the bottom of the chassis and the top of the battery.

- b. Plug the cable plug into the receptacle in the top of the battery. Make sure that the plug is properly oriented with respect to the receptacle. When properly aligned, the plug and the receptacle mate without excessive force.

- c. Place the two sections of the case together. Close the case by placing the latches under the restraining hooks and pushing the latch so that it pulls the pieces of the case together. When properly closed, the latches lie flat against the case.

46. Replacing Tubes

- a. To remove a tube, the tube clamp assembly that keeps the tubes seated in their sockets must be removed. Each tube clamp assembly is secured to the block by a machine screw. Remove the screw and lockwasher; the tube clamp assembly will spring up because of the natural tension of the rubber tube seat. Disengage the other end of the tube clamp assembly and lift it free.

- b. Remove the tube by gently pulling it free of the socket. Because of the miniature construction of the socket, the socket pins are easily damaged. Be careful; replacement of a damaged socket is difficult.

- c. Before inserting tubes in the sockets, the leads projecting from the bottom of the tube must be cut to size if they are not already prepared. The leads must be $\frac{7}{32}$ inch long. Cut the leads to the proper length with diagonal pliers.

d. When replacing tubes, the red spot on the base of the tube must be placed next to the red spot near the socket.

e. Insert the tube through the appropriate hole in the tube guard strip. Make sure that the tube is firmly seated and that the red dots match.

f. After inserting the tube, replace the tube clamp assembly.

47. Removal of Receiver-Transmitter Chassis

a. Remove the two whip antenna bezel retaining screws.

b. Remove bezel assembly. (Be careful not to lose the O-ring.)

c. Remove the two flathead screws (located under bezel) which hold the chassis to the end of the case.

d. Remove the screw which holds the chassis to the bracket on the interior of the case.

e. Lift out the chassis slowly, making sure not to pull on the wires.

48. Gaining Access to Interior Components

a. Remove the receiver-transmitter chassis assembly.

b. Remove the two screws which hold the bracket to the interior of the case.

c. Remove the plastic corrosion shield.

Note. The chassis assembly and the components fastened to the interior of the case are now exposed and are accessible for repairs.

49. Removal of Earphone

a. Remove the three screws that fasten the earphone clamp ring. Lift up the earphone clamp ring and gently lift out the earphone.

b. Loosen the two screws on the side of the earphone. The phone tips connecting the earphone to the case can then be pulled out of the earphone.

c. To reassemble, reverse the procedure in *a* and *b* above.

50. Removal of Microphone

a. Loosen the ten screws that fasten the con-

tact strip to the plate terminal strip. Disengage the strip by pulling the contact strip away from the plate terminal strip.

b. Remove the three screws that fasten the microphone clamp ring to the case.

c. Lift out the clamp ring, microphone, and the plate terminal strip.

d. Unsolder the leads from the microphone.

e. To reassemble, reverse the disassembly and removal procedure.

51. Removal of I-f Coils (L6, L8, L11, and L13)

a. Remove the two screws that hold the i-f slug and plate assembly. All four i-f coils and their slugs are supported by this strip. When the screws are removed, the strip will spring up because of the pressure of springs beneath the strip.

b. Lift up the strip gently to avoid damaging the connections to the coils.

c. Unsolder the leads of the defective coil and remove. L11 and L13 are shielded. This shield must be removed before these coils can be unsoldered.

d. To reassemble, reverse the disassembly and removal procedure above.

52. Removal of R-f Coils (L2 and L4)

a. Unscrew the two screws that secure the counter associated with the defective r-f coil.

b. Use a fine-bladed screw driver inserted through the tube guard assembly to loosen the entire counter assembly. Lift up the counter assembly. Be careful not to let it fall apart or disassemble.

c. Using the fingers, pull on the shaft with a rocking motion; the inductor slug will come out.

d. Unsolder the coil to permit its removal.

e. After replacing the coil, retune the stage to the desired frequency, set the counter to the corresponding reading, and replace the counter.

Note. To remove the other coils associated with the counters, follow the procedure in *a* through *e* above.

53. Removal of Discriminator

To replace the discriminator, remove the two screws, on the underside of the chassis, which

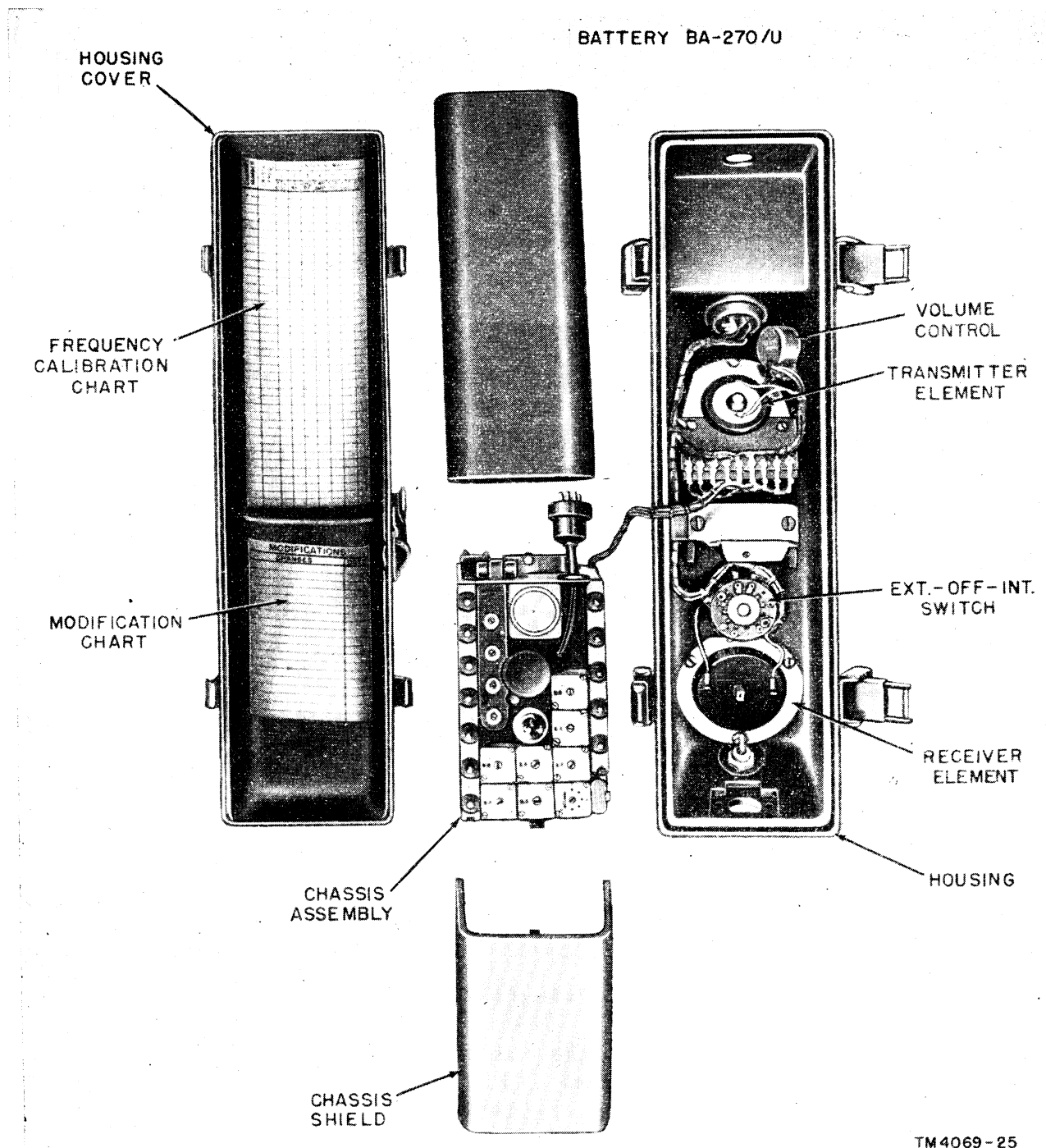
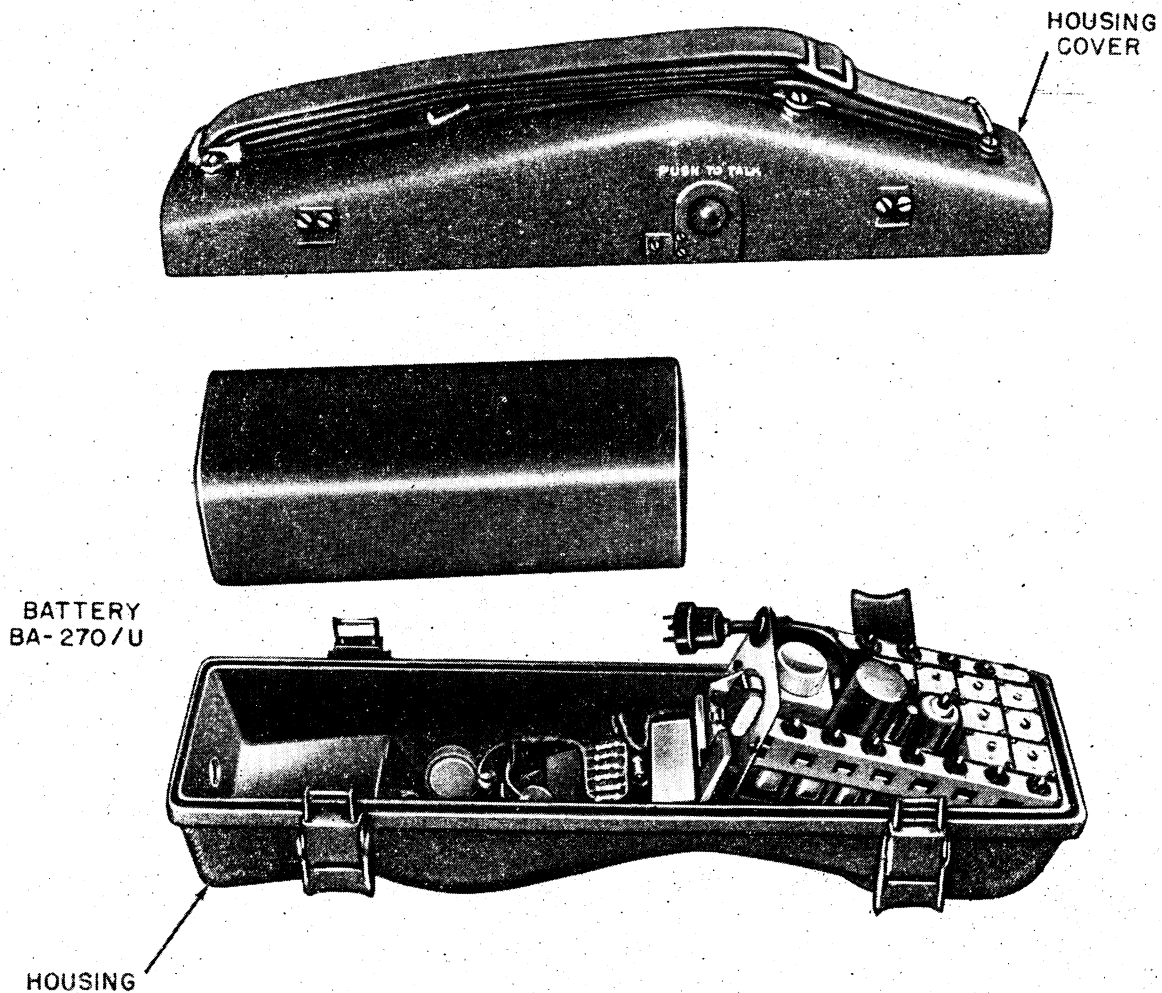


Figure 25. Radio Set AN/PRC-6, interior.

hold the discriminator in place. Unsolder all leads and tag them. Be careful when using the soldering iron because of the closeness of all components. Lift out the discriminator assembly through the top of the chassis.

54. Replacement of Transformer Assembly T2

To replace the transformer assembly, remove the two screws on the top side of the chassis.



TM4069-26

Figure 26. Installation of Battery BA-270/U.

These two screws are located alongside the transformer. Unsolder all leads from the transformer and tag them.

55. Refinishing

The case of Radio Set AN/PRC-6 is made of cast magnesium, and therefore requires little

attention. The outside is covered with an olive-drab paint for camouflage purposes. If the paint on the case is badly worn or scarred, refinish it. Use care to prevent the switches, the microphone holes, the antenna bushing, etc., from being filled with paint. Other general cautions to follow when resurfacing the equipment can be found in TM 9-2851.

CHAPTER 5

CHANNEL CHANGING AND ALINEMENT PROCEDURES

Section I. GENERAL

56. Channel Changing and Alinement Procedures

a. Two types of adjustments are performed on Radio Set AN/PRC-6: channel changing and alinement. Channel changing is the adjustment procedure performed each time the frequency of the equipment is changed. The channel-changing procedure may be performed also after repair of equipment. Alinement is a tuning procedure used on the i-f amplifiers and the discriminator and limiter after repairs.

b. Two channel-changing procedures are described in this manual. A VTVM is used for one procedure, and the other procedure is accomplished with Channel Alignment Indicator ID-292/PRC-6. Either instrument is satis-

factory. However, since Channel Alignment Indicator ID-292/PRC-6 was designed especially for use during channel-changing procedures, it is much more convenient.

57. Test Equipment Required

When changing channels with Channel Alignment Indicator ID-292/PRC-6, no other equipment is necessary. When using a VTVM during channel-changing procedures, a 100-ohm resistor is necessary. For alinement of the i-f and discriminator stages, a signal generator, capable of supply signals at a frequency of 4.3 mc, and a VTVM are necessary. Signal Generator I-208, or its equivalent, may be used for the 4.3-mc signal.

Section II. CHANNEL CHANGING

58. General

Channel changing is an r-f tuning operation. It consists of adjusting the positions of polyiron slugs serving as the cores of the seven variable inductors. The polyiron slugs are fastened to the ends of threaded shafts. Turning the threaded shaft moves the slug in and out of the core of the inductor and thereby varies its effective inductance. Each threaded shaft has a small plastic dial assembly mounted on it. The dials are called counters. A frequency calibration chart, mounted on the interior of the case cover, lists the counter settings for each of the 43 channels in which the equipment may be operated. The equipments are not individually calibrated. However, the calibrations are accurate to within 5 percent for any equipment.

59. Channel Changing with Channel Alignment Indicator ID-292/PRC-6

a. Remove the housing cover and the chassis shield. Install Battery BA-270/U and the new crystal and then set all counters to the numbers indicated to the right of the assigned frequency in the first column of the chart.

Note. The second column of the frequency calibration chart shows the crystal frequency corresponding to the assigned frequency. The crystals are marked with the crystal frequency on the surface opposite the pins and with the corresponding operating frequency on one side surface.

b. Remove the jumper wire from pins 1 and 7 of test socket J2 and insert the power plug of Channel Alignment Indicator ID-292/PRC-6.

c. Disconnect the whip antenna.

CHANNEL NUMBER	CRYSTAL FREQ.	COUNTER NUMBER						
		1	2	3	4	5	6	7
		XTL OSC	1ST RF	2ND RF	PWR AMP	XTR OSC	XTR DBL	ANT LDG
47.0	42.7	77	77	77	78	78	76	77
47.2	42.9	75	76	76	77	77	75	76
47.4	43.1	74	75	74	75	75	74	75
47.6	43.3	73	74	73	74	74	73	74
47.8	43.5	72	72	72	73	73	71	73
48.0	43.7	71	71	71	72	72	70	72
48.2	43.9	70	70	70	70	70	69	70
48.4	44.1	68	69	69	69	69	68	69
48.6	44.3	67	67	67	68	68	67	68
48.8	44.5	66	66	66	67	67	66	67
49.0	44.7	65	65	65	66	66	65	66
49.2	44.9	64	64	64	64	65	64	64
49.4	45.1	63	63	63	63	64	63	63
49.6	45.3	62	62	62	62	63	62	62
49.8	45.5	61	61	61	61	61	61	61
50.0	45.7	59	60	60	60	60	60	60
50.2	45.9	59	59	59	59	59	59	59
50.4	46.1	58	58	58	58	58	58	58
50.6	46.3	57	57	57	57	57	57	57
50.8	46.5	56	56	56	56	56	56	56
51.0	46.7	55	55	55	55	55	55	55
51.2	46.9	54	54	54	54	54	54	54
51.4	47.1	53	53	52	53	53	53	52
51.6	47.3	52	52	51	52	52	52.5	51
51.8	47.5	51	51	50	50	50	51.5	50
52.0	47.7	49	50	49	49	49	50.5	49
52.2	47.9	48	49	48	48	48	49.5	48
52.4	48.1	47	48	46	47	47	48.5	47
52.6	48.3	46	46	45	46	46	47.5	46
52.8	48.5	45	45	44	45	45	46.5	45
53.0	48.7	43	44	43	44	44	45.5	44
53.2	48.9	42	43	42	43	43	44.5	43
53.4	49.1	41	42	41	42	42	44	42
53.6	49.3	40	41	39	41	41	43	41
53.8	49.5	38	40	38	40	40	42	40
54.0	49.7	37	39	37	38	39	41	39
54.2	49.9	36	38	36	37	38	40	38
54.4	50.1	34	36	34	36	37	39	37
54.6	50.3	33	35	33	35	35	38	36
54.8	50.5	32	33	31	33	34	37	35
55.0	50.7	30	32	30	32	33	36	34
55.2	50.9	29	30	29	30	32	35	33
55.4	51.1	28	29	28	29	31	34	32

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Figure 27. Radio Set AN/PRC-6, frequency calibration chart.

d. Set the selector switch on Channel Alignment Indicator ID-292/PRC-6 to FIL position. Place Radio Receiver-Transmitter RT-196/PRC-6 in operation by setting the power switch to the INT. position. Read the condition of the

filament supply on the scale marked A. If the meter pointer falls below the orange portion of the scale, replace Battery BA-270/U.

e. Set selector switch of Channel Alignment Indicator ID-292/PRC-6 to the B+ position. Read the condition of the B+ supply on meter scale B. If the meter pointer falls below the orange portion of the scale, replace Battery BA-270/U.

f. Open filament switch S1 in the receiver-transmitter chassis. Set selector switch on the indicator to CAL position and calibrate by varying the screw-driver adjusted calibration control, located at the center of the selector switch knob on the indicator, until the meter pointer coincides with the red calibration line on the meter dial. Close the filament switch.

g. Set selector switch on Channel Alignment Indicator ID-292/PRC-6 to INJ position and adjust counter 1 for maximum and note the meter reading. Turn counter 1 in a counter-clockwise direction until approximately 80 percent of the maximum reading is obtained.

h. Set the selector switch on the indicator channel to LIM position. Adjust counters 3, 2, and 4, in that order, for maximum meter reading.

Note. The meter reading will increase progressively as counters 3, 2, and 4 are adjusted.

i. Open filament switch S1 and press the PUSH-TO-TALK switch on the receiver-transmitter, and with the selector switch on the indicator still in the LIM position, adjust counter 5 until a maximum meter reading is obtained.

j. Set the selector switch on the indicator to the DISC position. Press the PUSH-TO-TALK switch and slowly turn counter 5 and observe the discriminator voltage shown by the meter. The discriminator voltage should rise to a maximum peak, returning somewhere near the red line with continued rotation of counter 5 in one direction. Continuous rotation of counter 5 in the opposite direction from the original setting should cause the discriminator voltage to decrease to a minimum value and rise again to somewhere near the red line. Counter 5 is adjusted properly when the discriminator voltage reading coincides with the red line on the indicator and is between the maximum and minimum peaks previously mentioned. A further check for proper adjustment may be made by

rotating counter 5 clockwise and counterclockwise very slightly, which will cause the meter pointer to vary above and below the red line.

k. Set the selector switch on the indicator to the P.A.G. position. Press the PUSH-TO-TALK switch and adjust counter 6 for maximum meter reading.

l. Set the selector switch on the indicator, to P.A.P. position. Press the PUSH-TO-TALK switch and adjust counter 4 for minimum meter reading.

m. Connect the whip antenna to the receiver-transmitter. Press the PUSH-TO-TALK switch and with the selector switch on the indicator in the P.A.P. position, adjust counter 7 for maximum meter reading.

n. Disconnect Channel Alignment Indicator ID-292/PRC-6 from Radio Receiver-Transmitter RT-196/PRC-6, replace the jumper between pins 1 and 7, and close alignment switch S1. Replace the chassis shield and the housing cover.

o. As a final check after the radio set has been closed, press the PUSH-TO-TALK switch and speak into the microphone. Sidetone will be clear and undistorted if the radio set has been aligned properly. Turn off the power switch after the alignment and test have been completed.

60. Channel Changing Procedure, Using a VTVM

a. If Channel Alignment Indicator ID-292/PRC-6 is not available, the channel frequency of Radio Set AN/PRC-6 can be changed by the substitute method described below. For this method, Battery BA-270/U and a VTVM are required. Read all instructions carefully before attempting to change channels.

b. The point on the probe furnished with the VTVM is too large to fit metering socket J2 on Radio Receiver-Transmitter RT-196/PRC-6. Therefore it will be necessary to make an adapter. This can be done by soldering a piece of #18 AWG solid tinned copper wire to the end of the probe or by using an ordinary paper clip straightened out and crimped around the point of the test probe.

c. Remove the housing cover and chassis shield, install Battery BA-270/U and the new

crystal in the receiver-transmitter, and set all counters to the numbers located to the right of the assigned frequency, which is found in the first column of the frequency calibration chart.

Note. The second column shows the crystal frequency corresponding to the assigned frequency. The crystals are marked with the crystal frequency on the surface opposite the pins and with the corresponding operating frequency on one side surface.

d. Disconnect the whip antenna from the receiver-transmitter.

e. Place the receiver-transmitter in operation by setting the power switch to the INT. position. Set the VTVM range selector switch to the lowest scale, set the polarity switch to plus, and insert the probe in pin 5 of the metering socket. A reading between +1 and +1.5 volts should be obtained. If the reading is below +1 volt, replace Battery BA-270/U.

f. Set the meter range selector switch to read 90 volts, set the polarity switch to plus, and touch the probe to the jumper between pins 1 and 7 on the metering socket. If the voltage reading is below 60 volts, replace Battery BA-270/U.

g. Set the meter range selector switch on the lowest range, set the polarity switch to minus, and insert the probe in pin 2 of the metering socket. Adjust counter 1 for maximum and note the meter reading. Turn counter 1 in a counterclockwise direction until approximately 80 percent of the maximum reading is obtained.

h. Set the meter switch on the lowest range, set the polarity switch on minus, and insert the probe in pin 3 of the metering socket. Adjust counters 3, 2, and 4, in that order, for maximum meter reading.

Note. The meter reading will increase in value as counters 3, 2, and 4 are adjusted properly.

i. Set the meter range selector switch to the 10-volt scale and set the polarity switch to minus. The probe remains in pin 3 of the metering socket. Open filament switch S1. Press the PUSH-TO-TALK switch and adjust counter 5 until maximum meter reading is obtained.

j. Set the meter range selector switch to the 10-volt scale, set the polarity switch to minus, and insert the probe in pin 4 on the metering socket. A reading between -4 and -5 volts should be observed. Note this reading. Press the PUSH-TO-TALK switch and slowly turn counter 5 in the direction that returns the meter

pointer to the noted reading. Continued rotation of counter 5 will cause the meter reading to swing beyond the noted reading. If the counter is turned too far, reverse the direction of rotation and return the meter pointer to the noted reading.

k. Set the meter range switch to the 30-volt scale, set the polarity switch to minus, and insert the probe in pin 6. Press the PUSH-TO-TALK switch and adjust counter 6 for maximum meter reading.

l. Set the meter range switch to the lowest scale and set the polarity selector switch to plus. Remove the jumper between pins 1 and 7 on the metering socket and replace it with a 100-ohm resistor. Connect the minus test lead to pin 1 and connect the test probe to pin 7, using the leads which were soldered to the resistor. Press the PUSH-TO-TALK switch and adjust counter 4 for minimum reading.

m. Connect the whip antenna to the receiver-transmitter. The meter set-up remains the same as for *l* above. Press the PUSH-TO-TALK switch and adjust counter 7 for maximum meter reading.

n. Disconnect the meter, remove the 100-ohm resistor, and replace the jumper in pins 1 and 7. Close filament switch S1 on the receiver-transmitter and replace the housing cover and the chassis shield of the radio set case.

o. As a final check after the radio set has been closed, press the PUSH-TO-TALK switch and speak into the microphone. Sidetone will be clear and undistorted if the radio set is aligned properly. Turn off the power switch after the alinement and tests have been completed.

Section III. ALINEMENT

61. I-f Alinement

a. Couple the 4.3-mc signal, through a .01 μ f capacitor with short leads, to pin 1 of V2, with V2 removed. If Signal Generator I-208 is used, make sure that the signal generator is correctly calibrated to 4.3 mc. Connect the VTVM between test point 3 of J2 and ground.

b. Insert sufficient signal input to obtain a reading at test point 3. Adjust L13 for maximum meter indication and adjust carefully L11, L8, and L6, in that order, for maximum reading at test point 3. It will be necessary to reduce the signal level input as the i-f stages are alined. A normal limiter grid voltage of approximately -1.0 volt should be obtained with a signal input of 150 μ v.

62. Discriminator Alinement

a. Couple a 4.3-mc signal to pin 1 of V2, with V2 removed, through a .01- μ f capacitor. Connect a VTVM to test point 3 of J2 and adjust the signal level input so that a -5 -volt reading is obtained at point 3. Rock the signal generator for maximum at test point 3 and then reduce its output, if necessary, to obtain the -5 -volt reading.

b. Pull out filament switch S1, and with the VTVM connected to pin 4 of J2, adjust the VTVM so that it will read at the zero center of the meter scale. Set the scale switch to the 15- or 30-volt range.

c. Push down the filament switch and note the reading at test point 4. Adjust the knob on top of the discriminator until the reading on the VTVM is on the zero center of the meter. Note if the discriminator can be tuned above and below the zero center of the scale. If this is not possible, the discriminator should be replaced.

d. With the VTVM probe still connected to point 4, adjust the top discriminator knob so that the VTVM will read -0.6 volt on the 15-volt range or -1.0 volt on the 30-volt range. Tune the discriminator primary coil slug on the bottom of the discriminator so that the reading at point 4 will be increased.

e. Adjust the knob on the top of the discriminator until the reading on the VTVM is on the zero center of the meter scale.

f. Apply a signal of 4.325 mc and then 4.275 mc to pin 1 of V2. Note the readings at test point 4 at these two frequencies. If they are

not equal, adjust the primary (bottom knob) of the discriminator so that the larger reading will be reduced by one-half of the difference between the two frequency readings. For example, if the reading at one frequency is 6 volts

and the reading at the other frequency is 5 volts, the primary of the discriminator should be adjusted so that it will be 5.5 volts. Repeat this adjustment until the readings are equal at 4.325 mc and 4.275 mc.

CHAPTER 6

FINAL TESTING

63. General

This chapter is intended as a guide to be used in determining the quality of a repaired Radio Set AN/PRC-6. The minimum test requirements outlined in paragraphs 65 through 70 below may be performed by maintenance personnel with adequate test equipment and the necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation.

64. Test Equipment Required for Final Testing

The instruments required for testing the repaired equipment are listed below:

- a. Signal generator, such as Signal Generator Set AN/URM-27, with metered output covering the frequency range from 47.0 to 55.4 mc.
- b. Electronic multimeter, such as Electronic Multimeter TS-505/U.
- c. Resistor, 50-ohm, $\frac{1}{2}$ watt.
- d. Resistor, 600-ohm, $\frac{1}{4}$ watt.
- e. Signal Generator I-208, for 4.3-mc signal.
- f. Capacitor, .01- μ f, 400 vdcw.
- g. R-f meter (stock No 3F910-40).

65. Preliminary Check

A general over-all check of the performance of the equipment can be made by measuring the voltages and currents at the test points of jack J2. The correct readings and the control settings for each test point are tabulated in paragraph 36. An incorrect reading indicates that further corrective maintenance is needed.

66. Calibration Check

a. It is important that the counter settings of repaired equipment be checked against the

calibration chart. In the event that repair procedures have altered the characteristics of circuit elements sufficiently to cause abnormal disagreement between the calibration chart and the counter reading for any particular frequency, the cause for the deviation must be determined.

b. Before the set is returned to the field, channel-changing procedures for five frequencies through the band should be performed. The five frequencies recommended are 47, 49, 51, 53, and 55 mc. Perform the channel changing in accordance with the procedures described in paragraphs 59 or 60.

c. If one of the counter readings deviates by more than 5 percent for one or two of the frequencies, the circuit components associated with the misreading counter should be checked for placement and condition.

67. Sensitivity Check

a. Check the sensitivity at 47.0, 51.2, and 55.4 mc. Set up the equipment in the following manner:

- (1) Connect the output terminal of the signal generator through a 50-ohm noninductive resistor to J3.
- (2) Set the EXT.-OFF-INT. switch in the EXT. position.
- (3) Connect a 600-ohm resistor between pin 5 of E2 and ground.
- (4) Connect the multimeter across the 600-ohm resistor.

b. Adjust the signal generator to the receiver operating frequency.

c. Adjust the generator attenuator control for a 2.5- μ v input signal with modulation on.

Note. The modulating frequency is to be 1,000 cycles with a deviation of 15 kc.

d. Set the VOLUME control to a maximum clockwise position, and retune the signal gen-

erator for maximum audio output at the receiver.

e. Turn modulation off and adjust VOLUME control for a .1-mw (milliwatt) output across the 600-ohm resistor.

f. Turn modulation on and adjust the signal generator output for a 1 mw output across the 600-ohm resistor.

g. Readjust the VOLUME control and the signal generator output control until the receiver output is 1 mw with modulation on and .1 mw with modulation off.

h. The signal generator output should be less than 1 μ v.

Note. The voltage reading for .1 mw across 600 ohms is approximately .08 volt. The voltage reading for 1.0 mw across 600 ohms is approximately .8 volt.

68. Selectivity

a. Remove V2 and connect Signal Generator I-208 to pin 1 of the socket through a .01- μ f capacitor.

b. Adjust the signal generator to operate at 4.3 mc, unmodulated. Adjust the output for a reading of 1 volt between test point 3 and ground.

c. Double the output of the signal generator, and then vary its frequency to the low side of 4.3 and then to the high side of 4.3 mc to obtain the reading at test point 3 of 1 volt. These are the two times down points.

d. Repeat c above with 1,000 times the original input signal. These are the 1,000 times down points.

e. The bandwidth should be as follows:

<i>Times down</i>	<i>Total bandwidth (kc)</i>
2	70-90
1000	750 maximum

69. Discriminator Characteristics

a. With no signal applied and filament switch S1 open (pulled up), place the set in operation and measure the voltage at test point 4. This is the *bias*.

b. Remove V2 and connect Signal Generator I-208 through a .01- μ f capacitor to pin 1 of the socket.

c. Set the signal generator to operate at 4.3 mc, unmodulated. Depress S1 and adjust the signal generator output for a voltage reading of 5 volts at test point 3.

d. The voltage reading at test point 4 should be the *bias* \pm .25 volt.

e. Operate the signal generator at 4.325 mc and then at 4.275 mc. Record the voltages at test point 4.

f. At 4.325 mc, the reading should be the *bias* +6 volts; at 4.275 mc, the reading should be the *bias* -6 volts; the difference between the absolute values should be less than 1 volt.

70. Power Output

a. Connect the 50-ohm resistor in series with the RF ammeter and connect between J3 and ground.

b. Set the EXT.-OFF-INT. switch to the INT. position and depress the PUSH-TO-TALK switch.

c. The meter reading should be at least 70 ma which indicates a power output of at least .25 watt.

71. Modulation Sensitivity

a. The frequency deviation may be determined by measuring the a-c voltage output created by a known input signal and then comparing this reading to that caused by the transmitter whose deviation is to be measured.

b. Apply the output of an f-m signal generator to a receiver and note the magnitude of the discriminator a-c output voltage for specific settings of the deviation control on the signal generator. With the signal generator removed, and the calibrated receiver tuned to the transmitter, the value of the discriminator a-c output voltage then can be used to determine the deviation of the transmitter signal.

c. The deviation will be between 15 and 25 kc for an audio input to the microphone of 30 μ v at 1,000 cycles per second.

Note. The readings given in this chapter may vary approximately \pm 20 percent.

CHAPTER 7

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

72. Preparation

a. Before the equipment is packed for shipment or storage, the antenna should be placed in its stored position (wrapped around the case) and the battery should be removed. Removal of the battery is especially important, since it may leak.

b. To remove the battery, open the case. When the case is open, remove the battery by gently pulling the battery plug from the top of the battery and lifting out the battery.

c. Unscrew the antenna from the antenna terminal. Slip the free end under the latches on the side of the case opposite to the PUSH-TO-TALK switch. Pull on the free end of the antenna until the captive end of the antenna comes up against the end of the case. Wrap the antenna around the bottom end of the case. Slip the end under the bottom latch on the side of the case with the PUSH-TO-TALK switch and secure it under the clip located next to the switch.

73. Repacking for Shipment or Limited Storage

a. The exact procedure for repacking for shipment or limited storage depends on the material available and the conditions under which the equipment is to be shipped or stored. Whenever possible, use the original packing materials. If this cannot be done, duplicate the original packing as closely as possible. See paragraph 14, TM 11-296.

b. Whenever practicable, place a dehydrating agent such as silica gel inside the carton. Protect the carton with a waterproof paper barrier. Seal the seams of the paper barrier with waterproof sealing compound or tape. Pack the protected carton in a padded wooden case, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and the case.

Section II. DEMOLITION TO PREVENT ENEMY USE

74. General

The demolition procedures outlined in paragraph 75 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only on order of the commanding officer. 4

75. Methods of Destruction

a. Smash. Smash crystals, tubes, main chassis, and handset, using heavy tools. If none of

these are available, use one piece of the case as a hammer.

b. Burn. Burn everything that cannot be smashed completely, including instruction books. Use gasoline, kerosene, oil, or incendiary grenades.

c. Explosives. If explosives are necessary, use firearms or grenades.

d. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

e. Destroy Everything.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310-20-3, SR 310-20-4, and SR 310-20-5. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalog pamphlets.

1. Army Regulations

AR 380-5 Military Security (Safeguarding Military Information).

AR 750-5 Maintenance of Supplies and Equipment. (Maintenance Responsibilities and Shop Operation).

2. Supply Publications

SB 11-6 Dry Battery Supply Data.

SB 11-47 Preparation and Submission of Requisitions for Signal Corps Supplies.

SB 11-76 Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Painting, Preserving, and Lubrication

TB SIG 13 Moistureproofing and Fungiproofing Signal Corps Equipment.

TM 9-2851 Painting Instructions for Field Use.

4. Camouflage

FM 5-20 Camouflage, Basic Principles.

5. Decontamination

TM 3-220 Decontamination.

6. Demolition

FM 5-25 Explosives and Demolitions.

7. Other Publications

FM 24-18 Radio Communications.

FM 72-20 Jungle Warfare.

SR 310-20-3 Index of Training Publications.

SR 310-20-4 Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.

SR 700-45-5 Unsatisfactory Equipment Report (Reports Control Symbol CSGLD-247).

SR 745-45-5 Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD-66 (Army), SandA-70-6 (Navy), and AF-MC-U2 (Air Force)).

TB SIG 4 Methods for Improving the Effectiveness of Jungle Radio Communication.

TB SIG 54	Working Through Jamming with Frequency Modulated Radio Sets.	TM 11-499	(Preliminary), Radio Propagation Handbook.
TB SIG 66	Winter Maintenance of Signal Equipment.	TM 11-661	Electrical Fundamentals (Direct Current).
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.	TM 11-2627	Tube Testers I-177 and I-177-A.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.	TM 11-5511	Electronic Multimeter TS-505/U.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.	TM 11-5522	Signal Generator Set AN/URM-27.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.	TM 11-5527	Multimeter TS-352/U.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.	TM 11-317	Signal Generator I-208.
TB SIG 223	Field Expedients for Wire and Radio.	TM 11-4000	Trouble Shooting and Repair of Radio Equipment.
TM 11-314	Antennas and Antenna Systems.		
TM 11-453	Shop Work.		
TM 11-466	Radar Electronic Fundamentals.		
TM 11-476	Radio Direction Finding.		
TM 11-483	Suppression of Radio Noises.		
TM 11-486	Electrical Communication Systems Engineering.		
TM 11-490	Electrical Fundamentals.		

8. Abbreviations

a-c	alternating-current
a-f	audio-frequency
afc	automatic frequency control
d-c	direct-current
f-m	frequency-modulated
h-f	high-frequency
i-f	intermediate-frequency
kc	kilocycle
ma	milliampere
mc	megacycle
r-f	radio-frequency
μ f	microfarad
μ h	microhenry
$\mu\mu$ f	micromicrofarad
μ v	microvolt
v	volt
VTVM	vacuum-tube voltmeter

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite a specific T/O&E, T/A, SIG 7&8, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalog applicable to the equipment covered in this manual is SIG 7&8-AN/PRC-6. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

1. Identification Table of Parts for Radio Set AN/PRC-6

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
Y1	RADIO SET: Army-Navy Radio Set AN/PRC-6; .25 w output; 47 to 55.4 mc.		2S3503-6
	RECEIVER-TRANSMITTER: Army-Navy Radio Receiver-Transmitter RT-196/PRC-6; p/o Radio Set AN/PRC-6; .25 w output; 47 to 55.4 mc.		2C5130-196
	HANDSET: Army-Navy Handset H-33C/PT; batt powered; carbon type.	Auxiliary microphone and earphone.	2B620-33
	CRYSTAL UNIT: Army-Navy Crystal Unit CR-23/U; quartz; 46.7 mc nom freq.	Crystal oscillator-----	*2X224-46.7
	BATTERY: Army-Navy Battery BA-270/U; dry type; 3 sect; output 1.5 v, 4.5 v, 45 v, and 90 v.	Power source for equip- ment.	3A275-270
	TM 11-296----- TM 11-4069-----	----- -----	Order through AGO. Order through AGO.

* To requisition crystals of other frequencies, change 46.7 in stock No. to read desired frequency in mc.

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
J1	ADAPTER, antenna: 1" lg x 3/16" dia; Utility Electronics Corp dwg #1891; ea.	Whip antenna adapter---	2Z1409-212
	ANTENNA: whip type; 47 to 55.4 mc freq range; 24 3/16" lg; Utility Electronics Corp dwg #PB-1898; ea.	Receives and transmits r-f signals.	2A288A-113
A20	BASE, antenna: 1/2" dia x 1" lg o/a; Raytheon dwg #PB-1899; ea.	Base screw for antenna---	2A326-28
A5	BRACKET: batt positioner and cover fastener; "2" shape; 2 1/2" lg x 1 1/4" wd x 3/16" h o/a; Utility Electronics Corp dwg #PB-1817; ea.	Mounting bracket for receiver-transmitter chassis.	2Z1244-177
A7	BRACKET: "2" shape; 2 3/16" lg x 1 3/16" wd x 3/16" d o/a; Raytheon dwg #PB-2032; ea.	Mounting bracket for receiver-transmitter chassis.	2Z1239.291
A12	BRACKET: "L" shape; 1 3/4" lg x .325" wd x 1/4" d; Raytheon dwg #PB-2654; ea.	Supports receiver tube retainer.	2Z1239.290
A13	BRACKET: "L" shape; 1 3/4" lg x .325" wd x 1/4" d; Raytheon dwg #PB-2655; ea.	Supports transmitter tube retainer.	2Z1239.289

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O-25	BUSHING: .356" lg x .563" dia o/a, $\frac{3}{8}$ "-32 NC-2 thd .249" lg, .045" thk, shoulder .455" dia, .064" thk, .150" dia hole ctb $\frac{1}{4}$ " dia x $\frac{3}{4}$ " d from fl end; Utility Electronics Corp dwg #PB-1837; ea.	Switch plunger guide-----	2Z1409-260
E37	CABLE RG-58C/U: coax; 52 ohms impedance; 1 ft-----	Connects oscillator to mixer.	1F425-58C
W2	CABLE ASSEMBLY, special purpose, electrical: 7 cond, #26 AWG, stranded, polyvinyl ins, rubber jacket; 4" lg excluding terminations; Utility Electronics Corp part/dwg #PA-1856; ea.	Battery cable-----	3E7370-1.4.1
	CAP: base for discriminator; .625" lg x $\frac{1}{16}$ " dia o/a; Utility Electronics Corp dwg #PB-2659; ea.	Discriminator cap-----	2Z1619-128
	CAP: top for discriminator; .438" lg x .875" dia o/a; Utility Electronics Corp dwg #PB-2660; ea.	Discriminator cap-----	2Z1619-129
H2	CAP, Microphone: $1\frac{3}{4}$ " OD x 1" ID x $\frac{3}{4}$ " h; Raytheon part/dwg #PB-1839; ea.	Microphone cap-----	2Z1619-127
C2, C7, C45, C54	CAPACITOR, fixed: ceramic dielectric; 3 μmf $\pm 5\%$; 500 vdcw; JAN type CC20CJ030D; ea.	C2: V1 plate tuning----- C7: V2 plate tuning C45: V13 plate tuning and V1 input tuning. C54: V12 plate tuning	3D9003-48
C42	CAPACITOR, fixed: ceramic dielectric; 5 μmf $\pm 5\%$; 500 vdcw; JAN type CC20CJ050D; ea.	V9 plate tuning-----	3D9005-129
C41	CAPACITOR, fixed: ceramic dielectric; 6 μmf $\pm 5\%$; 500 vdcw; JAN type CC20PJ060D; ea.	V9 to V3 coupling-----	3D9006-43
C48	CAPACITOR, fixed: ceramic dielectric; 6 μmf $\pm 5\%$; 500 vdcw; JAN type CC20CJ060D; ea.	V10 to V11 coupling-----	3D9006-40
C26	CAPACITOR, fixed: ceramic dielectric; 20 μmf $\pm 10\%$; 500 vdcw; JAN type CC20PJ200K; ea.	V6 to V7 coupling-----	3D9020-69
C10, C16, C20, C24, C50	CAPACITOR, fixed: ceramic dielectric; 30 μmf $\pm 5\%$; 500 vdcw; Erie type #CC20RH300J; ea.	C10: V3 plate tuning----- C16: V4 plate tuning C20: V5 plate tuning C24: V6 plate tuning	3D9030-77
C1, C4, C9, C14, C18, C22, C49, C53, C55	CAPACITOR, fixed: ceramic dielectric; 47 μmf $\pm 5\%$; 500 vdcw; JAN type CC30PH470J; ea.	V11 tank tuning-----	3D9047-70
	CAPACITOR, fixed: ceramic dielectric; 47 μmf $\pm 10\%$; 500 vdcw; JAN type CC20SL470K; ea.	C1: D-c blocking and transmitter-receiver coupling. C4: 1st r-f to 2d r-f coupling. C9: 2d r-f to mixer coupling. C14: Mixer to 1st r-f coupling. C18: 1st i-f to 2d i-f coupling. C22: 2d i-f to 3d i-f coupling. C49: V11 d-c blocking and r-f coupling. C53: V11 to V12 coupling C55: V12 to V13 coupling	3D9047-28
C51	CAPACITOR, fixed: mica dielectric; 100 μmf $\pm 5\%$; 500 vdcw; .447" dia x $\frac{3}{32}$ " lg; Erie type #370CB; ea.	V11 tank tuning-----	3D9100-312
C36	CAPACITOR, fixed: ceramic dielectric; 470 μmf -20 + 80%; 600 vdcw; $\frac{3}{8}$ " lg x .156" thk; Centralab type #DD501; ea.	Discriminator de-emphasis.	3D9470-49

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C39	CAPACITOR, fixed: ceramic dielectric; 1000 $\mu\mu\text{f}$; 600 vdcw; $\frac{3}{8}$ " dia x $\frac{5}{32}$ " thk; Centralab type #DA-140-002A; ea.	Discriminator output audio coupling.	3DA1-333
C3, C12, C13, C17, C21, C25, C46, C56	CAPACITOR, fixed: ceramic dielectric; 2000 $\mu\mu\text{f}$; 150 vdcw; $\frac{1}{4}$ " lg x $\frac{1}{16}$ " wd x $\frac{3}{32}$ " thk; Glenco type CBM; ea.	C3: V1 plate and screen decoupling. C12: V3 filament bypass C13: V3 plate and screen decoupling. C17: V4 plate and screen decoupling. C21: V5 plate and screen decoupling. C25: V6 plate and screen decoupling. C46: V13 plate circuit decoupling. C56: V13 screen bypass	3DA2-215
C5, C11, C27, C30, C38, C40, C44, C57	CAPACITOR, fixed: ceramic dielectric; 15,000 $\mu\mu\text{f}$; 150 vdcw; $\frac{1}{2}$ " lg x $\frac{3}{8}$ " wd x $\frac{1}{8}$ " thk; Glenco type CBM; ea.	C5: V2 filament bypass C11: V3 filament bypass C27: Test point 3 decoupling. C30: V7 screen bypass C38: Audio input pre-emphasis. C40: V8 screen bypass C44: V9 filament bypass	3DA15-51
C6, C8, C15, C19, C23, C28, C37, C43, C47, C52	CAPACITOR, fixed: paper dielectric; 15,000 $\mu\mu\text{f}$ $\pm 20\%$; 100 vdcw; 1.062" lg x .175" dia; Sprague part #65P15392; ea.	C6: V2 filament bypass C8: V2 plate and screen decoupling. C15: V4 filament bypass C19: V5 filament bypass C23: V6 filament bypass C28: V7 filament bypass C37: Test point 4 decoupling. C43: V9 plate tank decoupling. C47: V10 plate circuit decoupling. C52: 90V B+ r-f bypass	3DA15-52
H11	CLAMP, electrical: holds $\frac{1}{4}$ " dia cable; $\frac{3}{16}$ " lg x $\frac{1}{16}$ " wd x $\frac{1}{16}$ " h o/a; Raytheon dwg #PB-2093; ea.	Cable clamp	2Z2642.550
O-6	CLAMP, electrical: 2 $\frac{3}{8}$ " lg x 1 $\frac{1}{4}$ " wd x $\frac{1}{4}$ " h; Utility Electronics Corp dwg #PB-1809; ea.	Feedthrough insulator support.	2Z6820.364
O-16	CLIP, ELECTRICAL: $\frac{1}{8}$ " lg x $\frac{1}{16}$ " wd x .077" h o/a; Raytheon dwg #PB-2033; ea.	Antenna stay clip	2Z2712.279
	CLIP, ELECTRICAL: knife blade type; $\frac{1}{8}$ " jaw opening; 1 $\frac{1}{8}$ " lg x $\frac{1}{16}$ " wd x $\frac{1}{16}$ " h o/a; Utility Electronics Corp dwg #PB-2094; ea.	Homing antenna connector contact.	2Z2712.241
L19	COIL, RF: .1 μh at 25 mc, .06 ohm d-c resistance; ant coupling; unshielded; .937" lg x .484" wd x .375" h; Utility Electronics Corp dwg #PB-2060; ea.	Input coupling coil	3C1084Z74-8
L20	COIL, RF: .67 μh at 25 mc; xmtr ampl; unshielded; .750" lg x .617" dia; Utility Electronics Corp dwg #PB-2025; ea.	V13 plate tuning and V1 grid tuning.	3C1084Z74-9
L24	COIL, RF: .72 μh at 25 mc, .258 ohm d-c resistance; xmtr doubler; unshielded; Utility Electronics Corp dwg #PB-2024; ea.	V12 plate tuning	3C1084Z74-10

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
L2, L4	COIL, RF: .75 μ h at 25 mc, .026 ohm d-c resistance; r-f plate coil; unshielded; .750" lg x .617" dia; Utility Electronics Corp dwg #PB-2026; ea.	L2: V1 plate tuning----- L4: V2 plate tuning	3C1084Z74-17
L15	COIL, RF: .90 μ h at 25 mc, .033 ohm d-c resistance; xtal osc, plate tank; unshielded; .750" lg x .615" dia; Utility Electronics Corp dwg #PB-2028; ea.	V9 plate tuning-----	3C1084Z74-14
L22	COIL, RF: 1.0 μ h at 25 mc, .036 ohm d-c resistance; xmtr osc; unshielded; .750" lg x .617" dia; Utility Electronics Corp dwg #PB-2027; ea.	V11 plate tuning-----	3C1084Z74-12
L18	COIL, RF: 1.2 μ h at 25 mc, .43 ohm d-c resistance; unshielded; .750" lg x .617" dia; Utility Electronics Corp dwg #PB-2029; ea.	Whip antenna loading---	3C1084Z74-13
L1, L3, L5, L7, L9, L12, L14, L17	COIL, RF: 1.6 μ h at 7.9 mc, .33 ohm d-c resistance; fil choke; unshielded; $\frac{1}{16}$ " lg x $\frac{3}{16}$ " dia; Utility Electronics Corp dwg #PB-1859; ea.	L1: V1 filament choke--- L3: V2 filament choke L5: V3 filament choke L7: V4 filament choke L9: V5 filament choke L12: V6 filament choke L14: V7 filament choke L17: V9 filament choke	3C1084Z74-18
L16	COIL, RF: 1.26 μ h at 7.9 mc; unshielded; .375" lg x .127" dia; Utility Electronics Corp dwg #PB-2652; ea.	V9 phase corrector-----	3C1084Z74-19
L6, L8, L11, L13	COIL, RF: 12 μ h at 4.3 mc, 1 ohm d-c resistance, .002 amp; i-f coil; unshielded; .400" lg x .500" dia; Raytheon dwg #PB-2675; ea.	L6: V3 plate tuning----- L8: V4 plate tuning L11: V5 plate tuning L13: V6 plate tuning	3C1084Z74-15
L10, L21, L23	COIL, RF: 25 μ h $\pm 10\%$ at 1.8 mc, 4 ohm d-c resistance; B+ choke coil; unshielded; $\frac{1}{16}$ " lg x $\frac{3}{32}$ " dia; Utility Electronics Corp dwg #PB-1860; ea.	L10: 45V B+ choke----- L21: V10 plate choke L23: V11 tank decoupling choke.	3C1084Z74-11
J3	CONNECTOR, receptacle: 1 rd mate cont; straight type; 1" lg x $\frac{3}{16}$ " dia; Utility Electronics Corp dwg #PB-1846; ea.	Homing antenna connector	2Z3062-243
J2	CONNECTOR, Receptacle: 7 rd male female cont, pol; straight type; $\frac{1}{16}$ " lg x $\frac{1}{16}$ " wd x $\frac{3}{8}$ " h; Raytheon dwg #PC-1876; ea.	Test point connector-----	2Z8677.164
J4	CONNECTOR, receptacle U-79/U: 10 rd button type male cont, pol; straight type; 1.072" lg x 1.286" dia; Sig dwg #SC-C-25168; ea.	Handset connector-----	2Z7250-79
E14	CONTACT, electrical: ant; 1 $\frac{1}{16}$ " lg x $\frac{3}{16}$ " wd x $\frac{1}{16}$ " d; Utility Electronics Corp dwg #PB-1892; ea.	Antenna contact-----	2Z3194-33
O-47	CORE, adjustable tuning: 2 $\frac{1}{16}$ " lg x $\frac{1}{16}$ " wd x 1.4625" h; Raytheon dwg #PB-2604; ea.	Tunes i-f circuits-----	2Z3262-72
O-46	CORE, adjustable tuning: 1 $\frac{1}{16}$ " lg x .618" dia; Utility Electronics Corp dwg #PB-1893; ea.	Tunes r-f circuits-----	2Z3262-54
	COUNTER, mechanical: 2 digits; .680" lg x .680" wd x .375" h; Utility Electronics Corp dwg #PD-1884; ea.	Indicates channel settings	6Z3417-53
A14	COVER: dust; approx 4 $\frac{1}{16}$ " lg x 3" wd x 2 $\frac{1}{16}$ " h; Raytheon dwg #PD-1806; ea.	Chassis cover-----	2Z3351-342
A2	COVER: rec shield; 1.394" lg x $\frac{3}{16}$ " wd x $\frac{1}{16}$ " h o/a; Raytheon dwg #PB-2600; ea.	I-f strip cover-----	2Z3351-344
A1	COVER: rec shield; 1 $\frac{1}{16}$ " lg x $\frac{3}{16}$ " wd x $\frac{1}{16}$ " h; Raytheon dwg #PB-2608; ea.	Receiver component cover	2Z3351-343
O-14	COVER, electrical connector: $\frac{1}{16}$ " lg x $\frac{3}{4}$ " dia; Utility Electronics Corp dwg #PB-2099; ea.	Antenna connector cap---	2Z3351-346
H23	COVER, electrical connector: c/o cover, clips, cord and clamps; 7 $\frac{1}{8}$ " lg x 1 $\frac{1}{2}$ " wd; Raytheon dwg #PB-2082; ea.	Lanyard assembly-----	2Z5045A

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
A6	COVER, electrical switch: plunger; $\frac{11}{16}$ " dia x $\frac{1}{8}$ " h; Utility Electronics Corp dwg #PB-1836; ea.	Switch sealing cover-----	3Z1723-7
CR3	CRYSTAL UNIT, rectifying: germanium; JAN type 1N69; ea.	Varies V11 tank frequency.	2J1N69
	DECAL: $7\frac{1}{4}$ " lg x $2\frac{1}{2}$ " wd; Raytheon dwg #PB-2034; ea.	Calibration chart-----	6D16777-21
	DECAL: inscribed w/freq, nomenclature, and serial No.; $2\frac{1}{4}$ " lg x $1\frac{3}{8}$ " wd; Raytheon dwg #PB-2035; ea.	Nameplate-----	6D16777-23
	DECAL: modifications; 4" lg x $2\frac{1}{2}$ " wd; Raytheon dwg #PB-2036; ea.	Modification chart-----	6D16777-22
V3	ELECTRON TUBE: tube type 2G21; ea-----	Mixer-----	2J2G21
V13	ELECTRON TUBE: tube type 3B4; ea-----	Power amplifier-----	2J3B4
V8,	ELECTRON TUBE: tube type 5672; ea-----	V8: Audio amplifier-----	2J5672
V9,		V9: Crystal oscillator	
V10		V10: Modulator	
V11,	ELECTRON TUBE: tube type 5676; ea-----	V11: Oscillator-----	2J5676
V12		V12: Doubler	
V1,	ELECTRON TUBE: tube type 5678; ea-----	V1: 1st r-f amplifier-----	2J5678
V2,		V2: 2d r-f amplifier	
V4,		V4: 1st i-f amplifier	
V5,		V5: 2d i-f amplifier	
V6,		V6: 3d i-f amplifier	
V7		V7: Limiter	
	FASTENER, latch: $2\frac{1}{16}$ " lg x $1\frac{1}{16}$ " wd x $\frac{1}{16}$ " h; Utility Electronics Corp dwg #PB-1761; ea.	Fastens both sections of case together.	6Z3810-100
O-38	GASKET: rubber; single hole; rd, $\frac{1}{2}$ " OD x $\frac{3}{8}$ " ID x $\frac{1}{16}$ " thk; Precision Rubber Prod #PRP-902-7; ea.	Seal for whip antenna bushing.	2Z4868.1153
O-40	GASKET: rubber; rd, $\frac{11}{16}$ " OD x $\frac{1}{2}$ " ID x $\frac{3}{32}$ " thk; Raytheon dwg #PB-2635; ea.	Discriminator cover gasket.	2Z4868.1150
O-39	GASKET: for cap; syn rubber; single hole; rd, $\frac{3}{4}$ " OD x $.612$ " ID x $.070$ " thk; Raytheon dwg #PB-2632; ea.	Discriminator cap gasket.	2Z4868.1151
O-37	GASKET: rubber; single hole; rd, $\frac{11}{16}$ " OD x $\frac{3}{4}$ " ID x $\frac{3}{32}$ " thk; Precision Rubber Prod #PRP-902-14; ea.	For arctic adapter-----	2Z4868.1152
O-36	GASKET: neoprene; single hole; rd, $1\frac{1}{16}$ " OD x $1\frac{1}{16}$ " ID x $\frac{1}{8}$ " thk; Raytheon dwg #PB-2633; ea.	For whip antenna connector.	2Z4868.838
O-41	GASKET: earphone; neoprene; single hole; rd, $1\frac{1}{8}$ " OD x $1\frac{5}{8}$ " ID x $\frac{1}{8}$ " thk; Raytheon dwg #PB-2631; ea.	For earphone-----	2Z4868.839
O-19	GASKET: for case; neoprene; single hole; rectangular, $13\frac{3}{16}$ " lg x $3\frac{1}{16}$ " wd x $.120$ " thk; Utility Electronics Corp dwg #PB-1873; ea.	Housing gasket-----	2Z4868.837
	GROMMET: rubber; fits $\frac{11}{16}$ " dia hole; $\frac{3}{16}$ " thk x $\frac{11}{16}$ " dia o/a; Canfield Rub part #3691-1; ea.	Cable guard-----	6Z4849-3
	GROMMET: rubber; fits $\frac{1}{2}$ " dia hole; $\frac{3}{16}$ " thk x $\frac{1}{2}$ " dia o/a; Canfield Rub part #3002; ea.	Cable guard-----	6Z4876-39
	HOLDER, strap: 2.187" lg x $\frac{1}{2}$ " wd x $\frac{3}{16}$ " thk; $\frac{3}{16}$ " wd cut-out entering slot; Raytheon dwg #PB-2055; ea.	For case carrying strap	2Z5042-112
	HOLDER, strap: 2.187" lg x $\frac{1}{2}$ " wd x $\frac{3}{16}$ " thk; Raytheon dwg #PB-2054; ea.	Strap holder	2Z5042-113
	HOLDER, strap: 2.187" lg x $\frac{3}{4}$ " wd x $\frac{1}{4}$ " h; Raytheon dwg #PB-2053; ea.	For case carrying strap	2Z5042-114
E29	INSULATOR, bowl: rd, ctb shape; black nylon; $\frac{1}{2}$ " ID; Utility Electronics Corp dwg #PB-1810; ea.	Whip antenna insulator	3G90-16
E21	INSULATOR, plate: fl rectangular shape; plastic type PBE, gold; $7\frac{1}{8}$ " lg x $2\frac{3}{8}$ " wd x $.030$ " thk, two .189" dia mtg holes on 1.31" mtg/e; Raytheon dwg #PB-2644; ea.	Barrier plate	3G320-318
II5	KEEPER, slide: 1.5" lg x $\frac{1}{2}$ " wd x $\frac{3}{16}$ " thk; Raytheon dwg #PB-2069; ea.	For carrying strap	2Z8558-12

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H5	KEEPER, slide: 1 $\frac{5}{8}$ " lg x 1 $\frac{3}{8}$ " wd x $\frac{3}{8}$ " thk; Raytheon dwg #PB-2068; ea.	For carrying strap-----	2Z8558-11
E6	KNOB: rd; olive drab, aluminum; marked w/arrow and VOLUME; $\frac{1}{2}$ " lg x $\frac{3}{4}$ " dia; Utility Electronics Corp dwg #PB-1875; ea.	VOLUME knob-----	2Z5822-502
O-11	KNOB: rd w/extended portion on ea side; olive drab, aluminum; marked EXT, OFF, and INT; 1 $\frac{1}{2}$ " lg x $\frac{7}{8}$ " wd x $\frac{1}{4}$ " thk; Utility Electronics Corp dwg #PB-1874; ea.	EXT.-OFF-INT. knob---	2Z5822-503
E3	MICROPHONE, element: 1 $\frac{1}{2}$ " dia x $\frac{3}{8}$ " thk; Telephonics part dwg #6382; ea.	Microphone -----	4B9860-4
H9	NUT, plain, hexagon: brass, cad pl, olive green finish; #12-28 NF-2; $\frac{3}{8}$ " wd across flats, $\frac{1}{16}$ " thk; Raytheon dwg #PB-2014; ea.	For mounting S1-----	6L3612-28-4
O-24	PIN, retaining: 1 $\frac{1}{2}$ " lg x $\frac{1}{16}$ " wd x .025" dia wire; Raytheon dwg #PB-2601; ea.	I-f cover shield retainer--	2Z7780-162
A22	PLATE, end: 2 $\frac{3}{4}$ " lg x 2 $\frac{3}{4}$ " wd x $\frac{3}{8}$ " thk excluding clip and tie strip; Raytheon dwg #PB-2059; ea.	End cover plate-----	2Z7091-047
O-45	PLUG, machine thread: .281" lg x 1" dia; Utility Electronics Corp dwg #PB-1834; ea.	For arctic adapter-----	6Z3888-97
O-9	PLUNGER: to actuate sensitive sw; .4775" lg x $\frac{1}{16}$ " dia o/a; Rivetco dwg #R-3312; ea.	Switch actuator-----	3Z4170-1
H17	PULLER, tube: approx 4 $\frac{3}{8}$ " lg x $\frac{1}{16}$ " dia; Raytheon dwg #PB-2669; ea.	To remove V13-----	6R7443-10
E4	RECEIVER ELEMENT, telephone: magnetic type; 300 ohms impedance at 1,000 cyc; 2" dia x $\frac{1}{16}$ " d o/a; Roanwell dwg #9742; ea.	Earphone -----	2B619-1
R2, R4, R9, R11, R13, R16, R17, R27	RESISTOR, fixed: comp; 1,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF102K; ea.	R2: V1 plate and screen decoupling. R4: V2 plate and screen decoupling. R9: V4 plate and screen decoupling. R11: V5 plate and screen decoupling. R13: V6 plate and screen decoupling. R16: V7 plate and screen decoupling. R17: V7 plate decoupling. R27: V9 tank decoupling.	3RC10BF102K
R24, R25	RESISTOR, fixed: comp; 15,000 ohms $\pm 5\%$; $\frac{1}{4}$ w; JAN type RC10BF153J; ea.	R24: Voltage divider microphone input circuit. R25: Voltage divider microphone input circuit.	3RC10BF153J
R7	RESISTOR, fixed: comp; 18,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF183K; ea.	V3 plate and screen decoupling.	3RC10BF183K
R6, R29	RESISTOR, fixed: comp; 22,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF223K; ea.	R6: V3 grid leak----- R29: V11 grid leak-----	3RC10BF223K
R15	RESISTOR, fixed: comp; 33,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF333K; ea.	V7 grid leak-----	3RC10BF333K
R30, R34	RESISTOR, fixed: comp; 56,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF563K; ea.	R30: V12 grid leak----- R34: Minimum volume limiting.	3RC10BF563K
R28, R32	RESISTOR, fixed: comp; 100,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF104K; ea.	R28: V9 grid leak----- R32: V13 grid leak-----	3RC10BF104K

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
R8, R10, R12	RESISTOR, fixed: comp; 220,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF224K; ea.	R8: V4 grid leak R10: V5 grid leak R12: V6 grid leak	3RC10BF224K
R1, R3, R5	RESISTOR, fixed: comp; 470,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF474K; ea.	R1: V1 grid leak R3: V2 grid leak R5: V3 grid leak	3RC10BF474K
R14, R22, R23, R26, R31	RESISTOR, fixed: comp; 1 meg $\pm 10\%$; $\frac{1}{4}$ w; JAN type RC10BF105K; ea.	R14: Test point 3 decoupling. R22: AFC filter R23: AFC filter R26: Test point 2 decoupling. R31: Test point 6 decoupling.	3RC10BF105K
R33	RESISTOR, variable: comp; 500,000 ohms $\pm 10\%$; $\frac{1}{4}$ w; $\frac{1}{16}$ " dia x $\frac{3}{16}$ " d; Utility Electronics Corp dwg # PB-1855; ea.	VOLUME control	3Z7498-50.154
O-20	RETAINER, crystal holder: $1\frac{1}{2}$ " lg x $\frac{1}{16}$ " wd x $\frac{5}{16}$ " d; Utility Electronics Corp dwg #PB-1844; ea.	Keeps crystal holder in place.	2Z7780-146
O-45	RETAINER, electron tube: approx $3\frac{3}{4}$ " lg x $\frac{1}{16}$ " wd; Raytheon dwg #PC-2672; ea.	Retains five tubes in transmitter.	2Z7780-164
O-43	RETAINER, electron tube: approx $5\frac{1}{8}$ " lg x $\frac{3}{8}$ " wd; Raytheon dwg #PB-2671; ea.	Retains seven tubes in transmitter.	2Z7780-163
O-8	RING, retainer: $2\frac{1}{16}$ " dia x .050" thk; Raytheon dwg #PB-1824; ea.	Clamp ring for microphone.	2Z7858-250
O-5	RING, retainer: spkr clamp; approx $2\frac{1}{4}$ " dia x $1\frac{7}{8}$ " ID x .062" thk; Raytheon dwg #PB-1808; ea.	Speaker clamp	2Z7858-254
E7	SCREEN, microphone: $1\frac{1}{2}$ " dia x .032" thk; Raytheon dwg #PB-1879P1; ea.	Microphone screen	2B2162-2
E40	SCREEN, microphone: $1\frac{1}{16}$ " dia x $\frac{1}{16}$ " d; Raytheon dwg #PB-1879P2; ea.	Microphone screen	2B2162-1
O-49	SEAL, dust: for diaph; $1\frac{7}{16}$ " dia x .003" thk; Raytheon dwg #PB-2678; ea.	Diaphragm sealing	2Z8085-1.39
	SEAL, dust: diaph sealing; $1\frac{1}{2}$ " dia x .050" thk o/a; Raytheon dwg #PB-1890; ea.	Diaphragm sealing	6Z8084-50.11
XY1	SOCKET, crystal: $\frac{7}{8}$ " lg x $\frac{3}{8}$ " wd x $\frac{1}{2}$ " h; Eby type #CR-7, dwg #9006; ea.	Crystal socket for Y1	2Z8761-60
X1, X2, X4 through X12	SOCKET, electron tube: Navy type #491940; 5 cont subminiature; force fit mtg; .350" lg x .218" wd x .281" h; Cinch part #54A11953; ea.	Tube sockets	2Z8675.89
X3	SOCKET, electron tube: 7 cont subminiature; force fit mtg; .459" lg x .218" wd x .296" h; Cinch dwg #11957; ea.	V3 socket	2Z8677.162
X13	SOCKET, electron tube: 7 cont miniature; 1 piece saddle mtg; $1\frac{3}{8}$ " lg x $\frac{3}{4}$ " wd x $\frac{1}{2}$ " h; Cinch dwg #12360; ea.	V13 socket	2Z8677.163
H21	SPRING: flat type; 1" lg x 1" wd x $\frac{1}{4}$ " h o/a; Utility Electronics Corp dwg #PB-2096; ea.	Retainer for receiver-transmitter cable.	2Z8677.630
O-15	SPRING: helical compression-extension type; $\frac{1}{2}$ " free lg x .467" OD x $\frac{3}{8}$ " ID; 4 turns; Raytheon dwg #PB-1897; ea.	For locking i-f	2Z8877.686
O-10	SPRING: helical compression type; sw plunger return; $\frac{3}{8}$ " lg x $\frac{3}{16}$ " dia; 7 turns; Utility Electronics Corp dwg #PB-1838; ea.	For S1	2Z8877.631
H6	STRAP, carrying: approx 49" lg x $1\frac{1}{4}$ " wd x $\frac{1}{16}$ " thk; Utility Electronics Corp dwg #PC-2067; ea.	Receiver-transmitter carrying strap.	6Z8448-23

2. Identification Table of Parts for Radio Receiver-Transmitter RT-196/PRC-6—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
S1	SWITCH, push-pull: SPST; $1\frac{1}{8}$ " lg x .275" dia o/a excluding term and actuating rod; Utility Electronics Corp dwg #PB-2015; ea.	Filament switch-----	3Z9815-14
S3	SWITCH, rotary: SPDT; $\frac{1}{2}$ " lg x $1\frac{1}{8}$ " dia; Oak part #45165-F1; ea.	EXT.-OFF-INT. switch--	3Z9825-62.555
S2	SWITCH, sensitive: SPST; $1\frac{3}{4}$ " lg x $\frac{3}{8}$ " wd x $\frac{3}{8}$ " h; Micro Sw dwg #X5358 type #V3; ea.	PUSH-TO-TALK switch	3Z9823-15.15
E2	TERMINAL BOARD: 10 spade type term; $2\frac{1}{2}$ " lg x $\frac{1}{8}$ " wd x $\frac{3}{4}$ " thk; Utility Electronics Corp dwg #PB-2647; ea.	For chassis cable terminations.	3Z770-9.29
E1	TERMINAL BOARD: 10 spade type term; $2\frac{1}{2}$ " lg x $\frac{1}{8}$ " wd x $\frac{3}{4}$ " h o/a; Utility Electronics Corp dwg #PB-2646; ea.	For control cable terminations.	3Z770-10.63
E24	TIP, phone: $\frac{1}{8}$ " lg x $\frac{1}{8}$ " dia; Raytheon dwg #PB-2288; ea.	-----	2Z9494A-6
T2	TRANSFORMER ASSEMBLY, AF: $2\frac{1}{8}$ " lg x $1\frac{5}{8}$ " wd x .875" d x MIL type TF2A19YY; ea.	Mic to grid and plate to earphone coupling.	2Z9639.14
U1	TRANSFORMER, discriminator: 4300 kc peak freq; 2.283" h x $1\frac{1}{8}$ " lg x $1\frac{1}{8}$ " wd; Utility Electronics Corp dwg #PC-2641; ea.	Discriminator assembly--	2Z9643.395
	WIRING HARNESS: approx 10" lg o/a; Raytheon dwg #PC-2668; ea.	Case cable assembly----	3E10000-11.2

3. Identification Table of Parts for Handset H-33C/PT

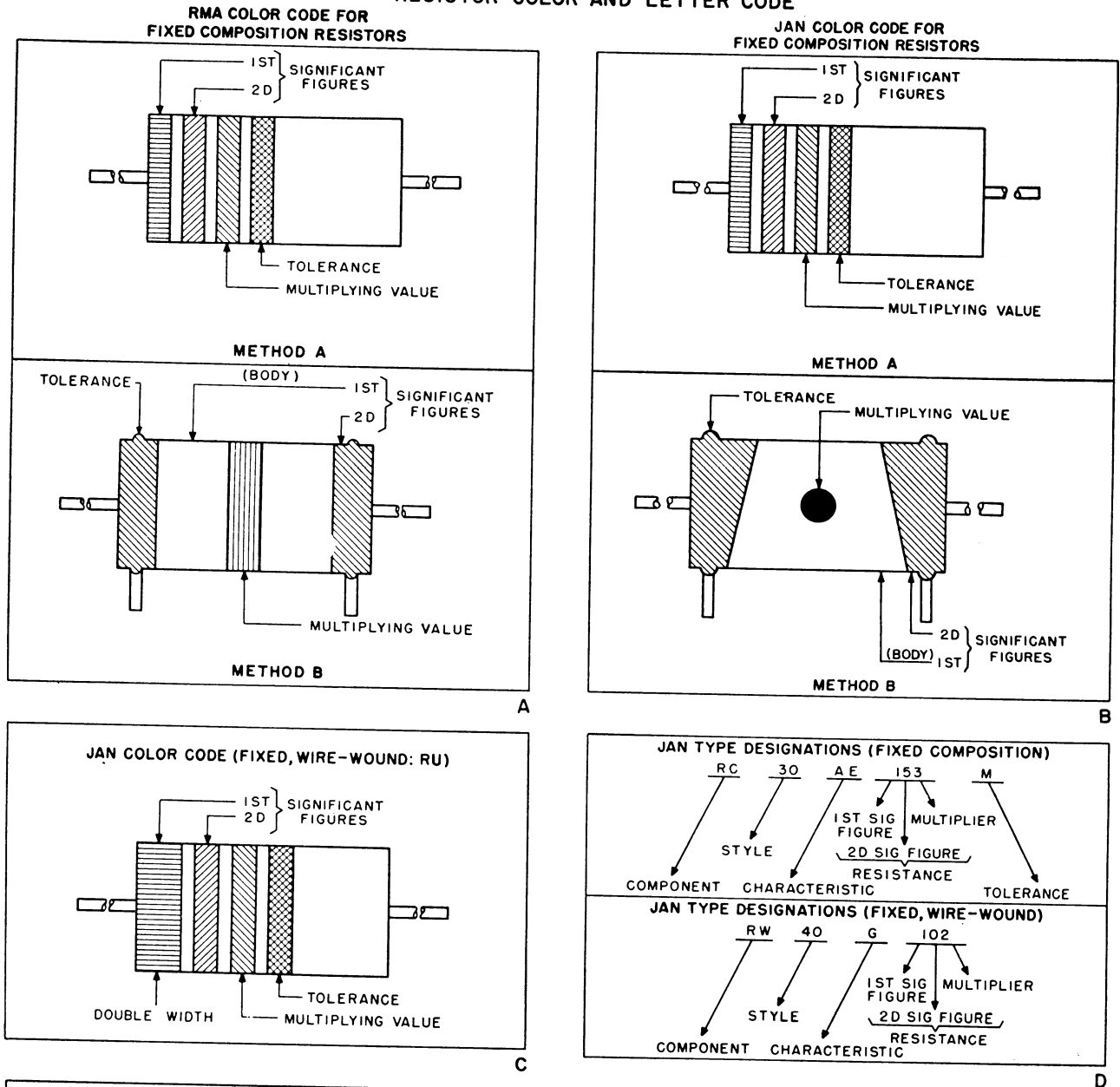
Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	HANDBSET H-33C/PT: batt powered; black ethyl cellulose handle, black ethyl cellulose receiver capsule, brass xmtr capsule, phenolic and steel push sw, phosphor bronze belt clip, black ethyl cellulose xmtr cap, Buna S rubber rec cap; rec batt powered, 300 ohms impedance, 1,000 cyc; xmtr carbon type, 40 ohms d-c resistance, 60 ma freq range 300 to 4000 cyc; blast-proof xmtr, wp, tp push to talk sw, frost repellent; general purpose.		2B620-33
	CAP, microphone: handset xmtr cap-----	-----	2B176-3
	CAP, microphone: handset xmtr cap-----	-----	2B176-4
	CAP, microphone: handset xmtr cap-----	-----	2B176-2
	CAP, telephone receiver: wp protective covering for tp rec.	-----	2B176-5
	CLIP: snap-on type; $\frac{1}{8}$ " max jaw opening-----	-----	2Z2712.206
	CLIP: snap-on type; $\frac{1}{8}$ " max jaw opening-----	-----	2Z2712.187
	CORD, handset: uses special purpose cable WM-62/U; 6' lg excluding terminations.	-----	3E7382-96
	COVER, electrical switch-----	-----	2Z3351-258
	COVER, electrical switch-----	-----	3Z1723-6.1
	COVER, electrical switch-----	-----	3Z1723-6
	GASKET: HS xmtr cap; neoprene; 1 hole; $1\frac{3}{8}$ " OD, $\frac{1}{8}$ " ID, x $\frac{3}{8}$ " h o/a.	-----	2Z4868.884
	GASKET: sw mtg; neoprene; 2 mtg holes $\frac{1}{8}$ " dia on $2\frac{3}{8}$ " mtg/c, 1 rectangular hole; $2\frac{7}{8}$ " lg x $\frac{5}{8}$ " wd x .023" thk o/a, rectangular w/rd ends.	-----	2Z4868.885
	GASKET: wp rec cover; lam phenolic ring w/pliofilm screen; $\frac{5}{8}$ " ID covered w/pliofilm; $1\frac{1}{4}$ " dia x $\frac{1}{2}$ " thk.	-----	2B312-2

3. Identification Table of Parts for Handset H-33C/PT—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
	GASKET: HS xmtr cap; Buna S rubber w/wp and frost repellent membrane covering ctr hole; single ctr hole 1¼" dia; 1½" dia x ⅜" thk o/a.	-----	2Z4868.817
	GASKET: for HS rec; neoprene; 1 hole; rd, 1½" OD x ¾" ID x .032" thk Utility Electronics Corp dwg #PB-2086.	-----	2Z4868.1149
	GLAND: wp packing type for cable hole	-----	2Z4879-15
	GLAND: wp packing for cable hole	-----	2Z4879-17
	GLAND: wp packing type for cable hole	-----	2Z4879-16
	HANDLE: HS; 7⅜" lg x 2⅜" wd x 2⅜" h o/a	-----	2Z4928-93
	HANDLE: HS; 7⅜" lg x 2⅜" wd x 2⅜" h o/a	-----	2Z4928-92
	HANDLE: HS; 7⅞" lg x 2⅜" wd x 3" h o/a	-----	2B545-3
	NUT, packing: ⅜"-32 EF-2 ext thd	-----	6L3800-5
	NUT, packing: .445"-32 NS-1 ext thd	-----	6L3866-32.2
	PLATE, cover: HS sw compartment	-----	2Z7093-262
	PLATE, cover: HS sw compartment	-----	2Z7091-424
	PLATE, cover: HS sw compartment	-----	2Z7091-363
	PLUG CONNECTOR U-77/U: 10 male, rd button cont, pol; straight; 3¼" lg x 1⅛" dia o/a; Utility Electronics Corp #PB-2275.	-----	2Z3030-30
	RECEIVER ELEMENT, telephone	-----	2B619-1
	SCREW, machine: slotted drive; Bind H semi-finished; 5-40 NC-2; ⅜" lg.	-----	6L20905
	SCREW, machine: slotted drive; Bind H; No. 4-40; ⅜" lg.	-----	6L6440-5.15
	SWITCH, push: DPST	-----	3Z9824-7
	SWITCH, push: DPST	-----	3Z9824-8
	SWITCH, push: DPST	-----	3Z9824-5
	TERMINAL, lug: sq tongue end type bbl wire connection; #18 AWG wire accommodated.	-----	3Z12073-67
	TERMINAL, stud: solder connection	-----	3Z12101-19
	TRANSMITTER ELEMENT, telephone: carbon type	-----	4B9860-4
	WASHER, flat: semicir, ctr hole ⅛" dia, OD ⅝", #4 screw size, .015" thk.	-----	6L53900-2
	WASHER, flat: rd, ctr hole ⅜" dia, OD ⅞", #5 screw size, ⅜" thk.	-----	6L50102N-2
	WASHER, flat: rd, ctr hole ⅜" dia, OD ⅞", #6 screw size, ⅜" thk.	-----	6L58023-55
	WASHER, flat: rd, ⅛" ID, ⅝" OD, ⅜" thk, #5 screw size	-----	6L54002-9

Note. Handset H-33D/PT is interchangeable with Handset H-33C/PT as an entire unit only. The parts list above is for components of Handset H-33C/PT only.

RESISTOR COLOR AND LETTER CODE

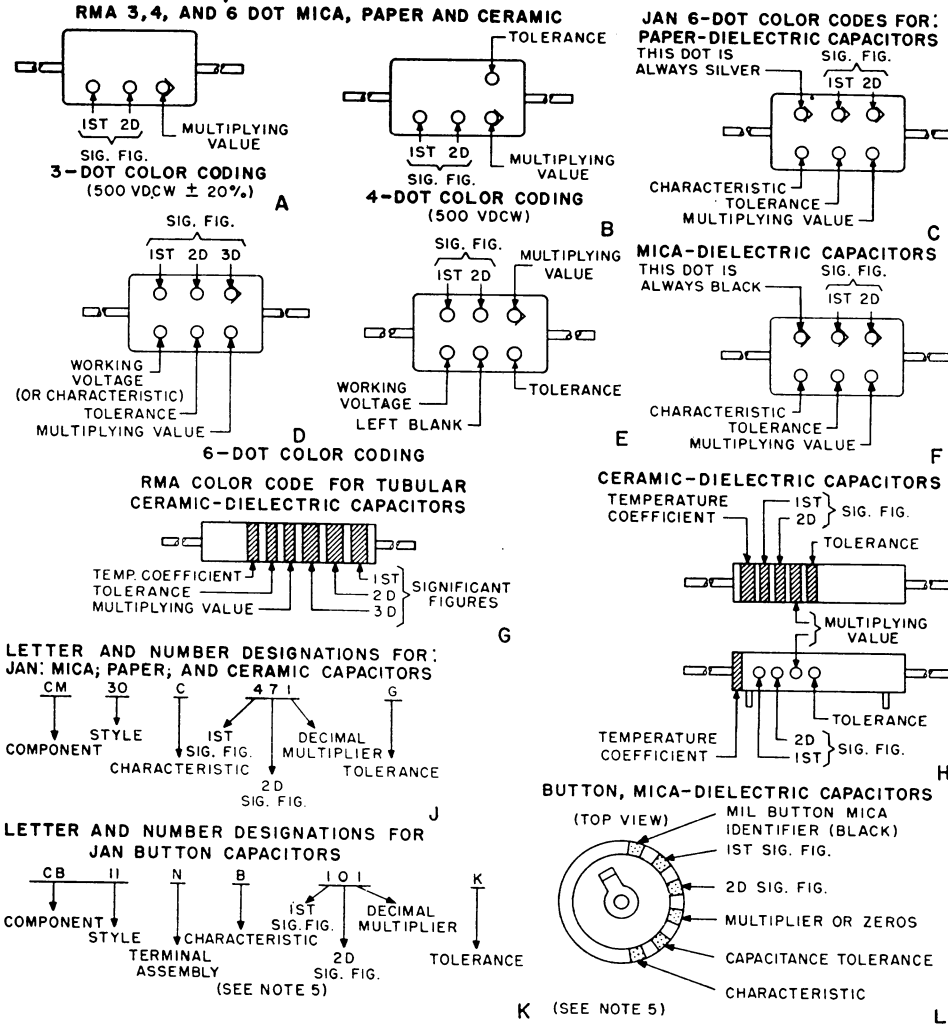


STANDARDS				
COLOR	SIGNIFICANT FIGURE	MULTIPLYING VALUE	TOLERANCE (%)	JAN LETTER TOLERANCE
BLACK	0	1	—	—
BROWN	1	10	± 1	F
RED	2	100	± 2	G
ORANGE	3	1,000	± 3	—
YELLOW	4	10,000	± 4	—
GREEN	5	100,000	± 5	—
BLUE	6	1,000,000	± 6	—
VIOLET	7	10,000,000	± 7	—
GRAY	8	100,000,000	± 8	—
WHITE	9	1,000,000,000	± 9	—
GOLD	—	0.1	± 5	J
SILVER	—	0.01	± 10	K
NO COLOR	—	—	± 20	M

- NOTES:**
1. RESISTORS WITH AXIAL LEADS ARE INSULATED. RESISTORS WITH RADIAL LEADS ARE NON-INSULATED.
 2. RMA: RADIO MANUFACTURERS ASSOCIATION.
 3. JAN: JOINT ARMY - NAVY.
 4. THESE COLOR AND NUMBER CODES GIVE ALL RESISTANCE VALUES IN OHMS.
 5. RESISTIVE COMPONENTS USED FOR LETTER TOLERANCES ARE: RC, RN, AND RU.
 6. WATTAGE FOR RW TYPES IS FOUND IN THE JAN SPECIFICATIONS UNDER CHARACTERISTICS.

Figure 28. Resistor color and letter code.

CAPACITOR COLOR AND LETTER CODES



- STANDARDS -				JAN MICA-CM		JAN PAPER-CM		JAN CERAMIC-CC						
COLOR	SIG. FIG.	DECIMAL MULTIPLIER	% TOL.	VDCW	LETTER TOL.	CHARACTERISTIC	LETTER TOL.	CHARACTERISTIC	DEC. MULT.	%	LETTER DESIGNATION	UUF	LETTER DESIGNATION	CHARACTERISTIC
BLACK	0	1	±20	500	M	A	M	A	1	±20	M	±2.0	G	C
BROWN	1	10	±1	100	-	B	-	E	10	±1	F	-	-	H
RED	2	100	±2	200	G	C	-	H	100	±2	G	-	-	L
ORANGE	3	1,000	±3	300	-	D	N*	J	1,000	-	-	-	-	P
YELLOW	4	10,000	±4	400	-	E	-	P	-	-	-	-	-	R
GREEN	5	100,000	±5	500	-	F	-	R	-	±5	J	±0.5	D	S
BLUE	6	1,000,000	±6	600	-	G	-	S	-	-	-	-	-	T
VIOLET	7	10,000,000	±7	700	-	-	-	T	-	-	-	-	-	U
GRAY	8	100,000,000	±8	800	-	-	-	-	0.01	-	-	±0.25	C	B
WHITE	9	1,000,000,000	±9	900	-	-	-	-	0.1	±10	K	±1.0	F	SL
GOLD	-	0.1	±5	1,000	J	-	-	-	-	-	-	-	-	A
SILVER	-	0.01	±10	2,000	K	-	-	-	-	-	-	-	-	-
NO COLOR	-	-	±20	500	-	-	-	-	-	-	-	-	-	-

* THE TOLERANCE OF THIS CAPACITOR IS ±30%, NOT ±20%

NOTES

- JAN: JOINT ARMY-NAVY
- RMA: RADIO MANUFACTURERS ASSOCIATION
- 1. THESE COLOR AND LETTER CODES GIVE CAPACITANCES IN MICROMICROFARADS
- 2. THIS TABLE IS ADAPTED FOR JAN AND RMA COLOR AND JAN LETTER TYPE DESIGNATIONS
- 3. CERAMIC AND MICA CAPACITORS, BOTH JAN AND RMA, ARE GENERALLY 500 VDCW
- 4. BUTTON CAPACITORS ARE GENERALLY 300 VDCW
- 5. READ BUTTON CAPACITOR TOLERANCE UNDER CERAMICS OF MORE THAN 10 UUF
- 6. CHARACTERISTICS ARE AVAILABLE IN JAN CAPACITOR SPECIFICATION MANUALS
- 7. THE COMPONENTS USED ABOVE FOR JAN LETTER TYPE DESIGNATIONS ARE:
 CC CERAMIC; CM MICA MOULDED; CN PAPER MOULDED

TM CC

Figure 29. Capacitor color and letter code.



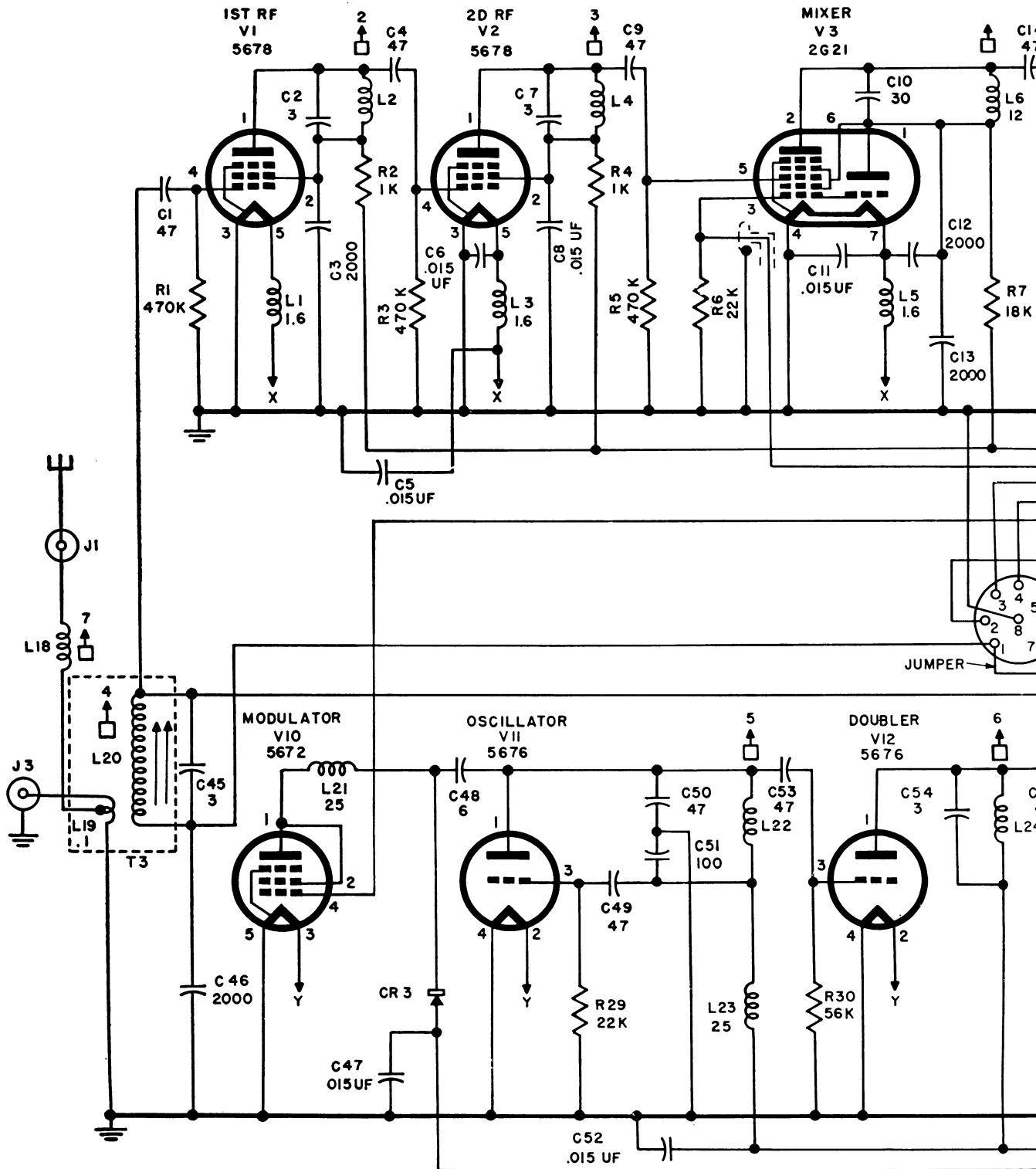
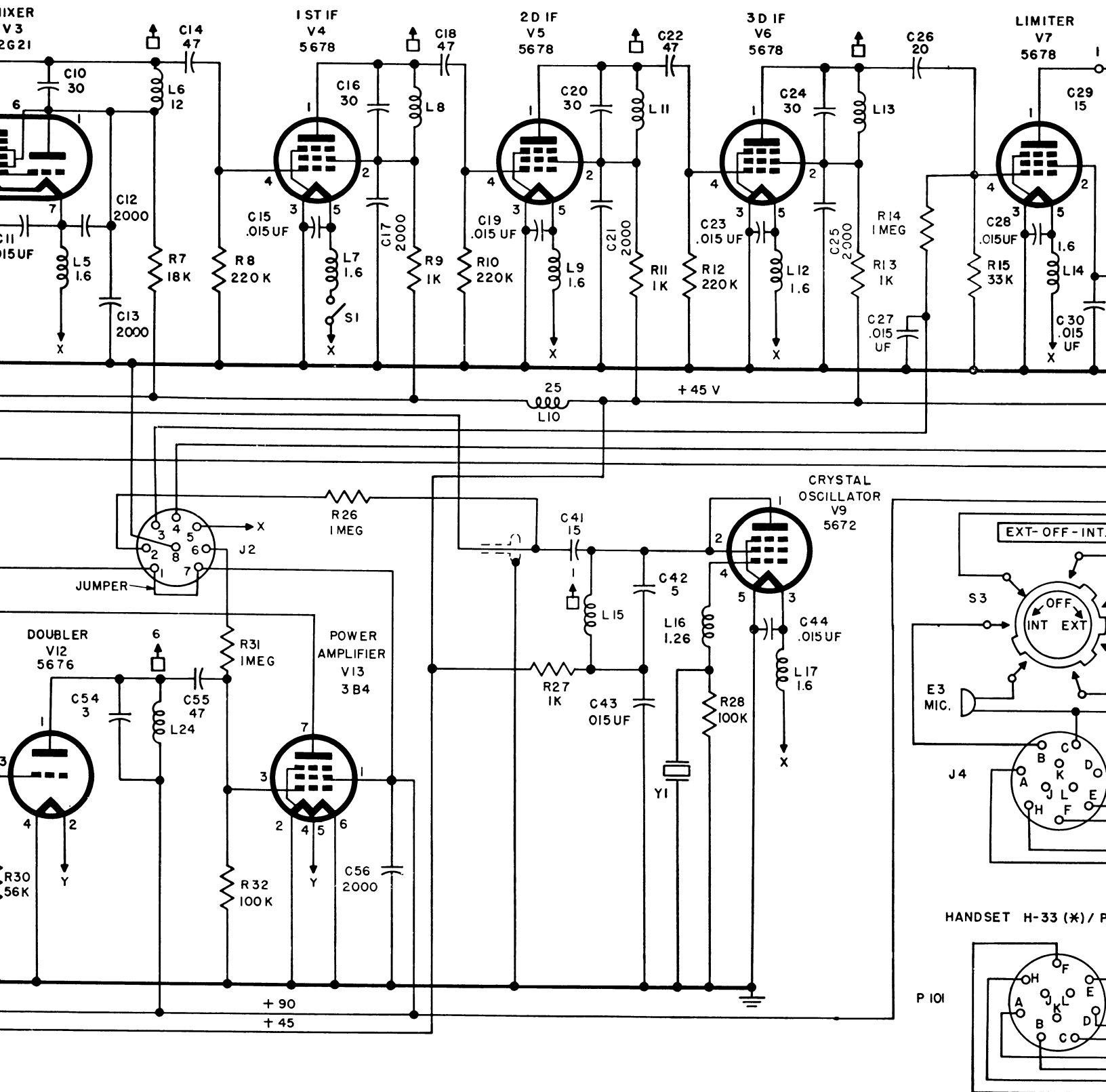
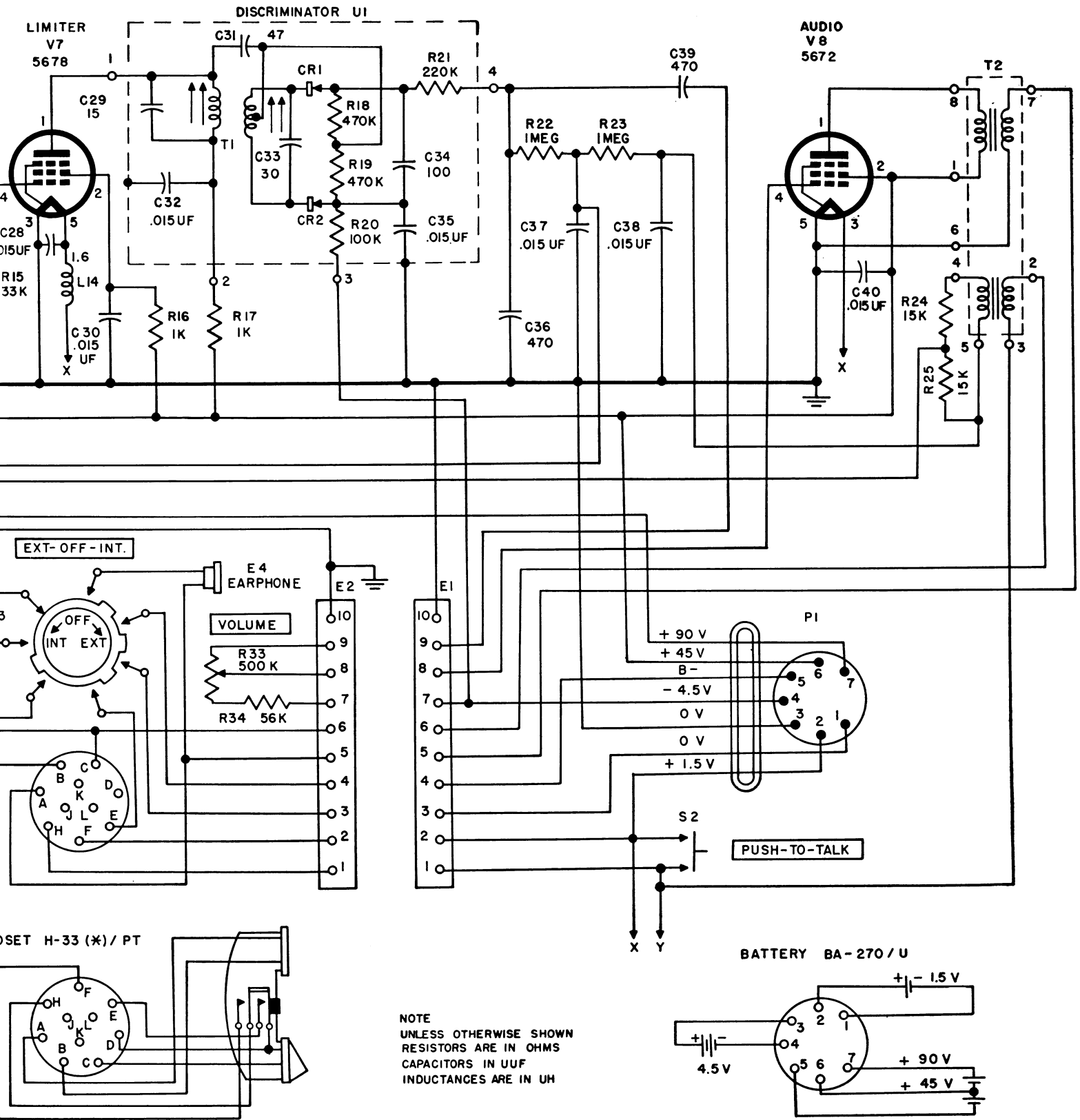


Figure 30. Radio Set AN/PRC-



30. Radio Set AN/PRC-6, schematic diagram. (On some equipments, C33 consists of a 20- μ f capacitor and a 10- μ f capacitor connected in parallel.)



NOTE
UNLESS OTHERWISE SHOWN
RESISTORS ARE IN OHMS
CAPACITORS IN UUF
INDUCTANCES ARE IN UH

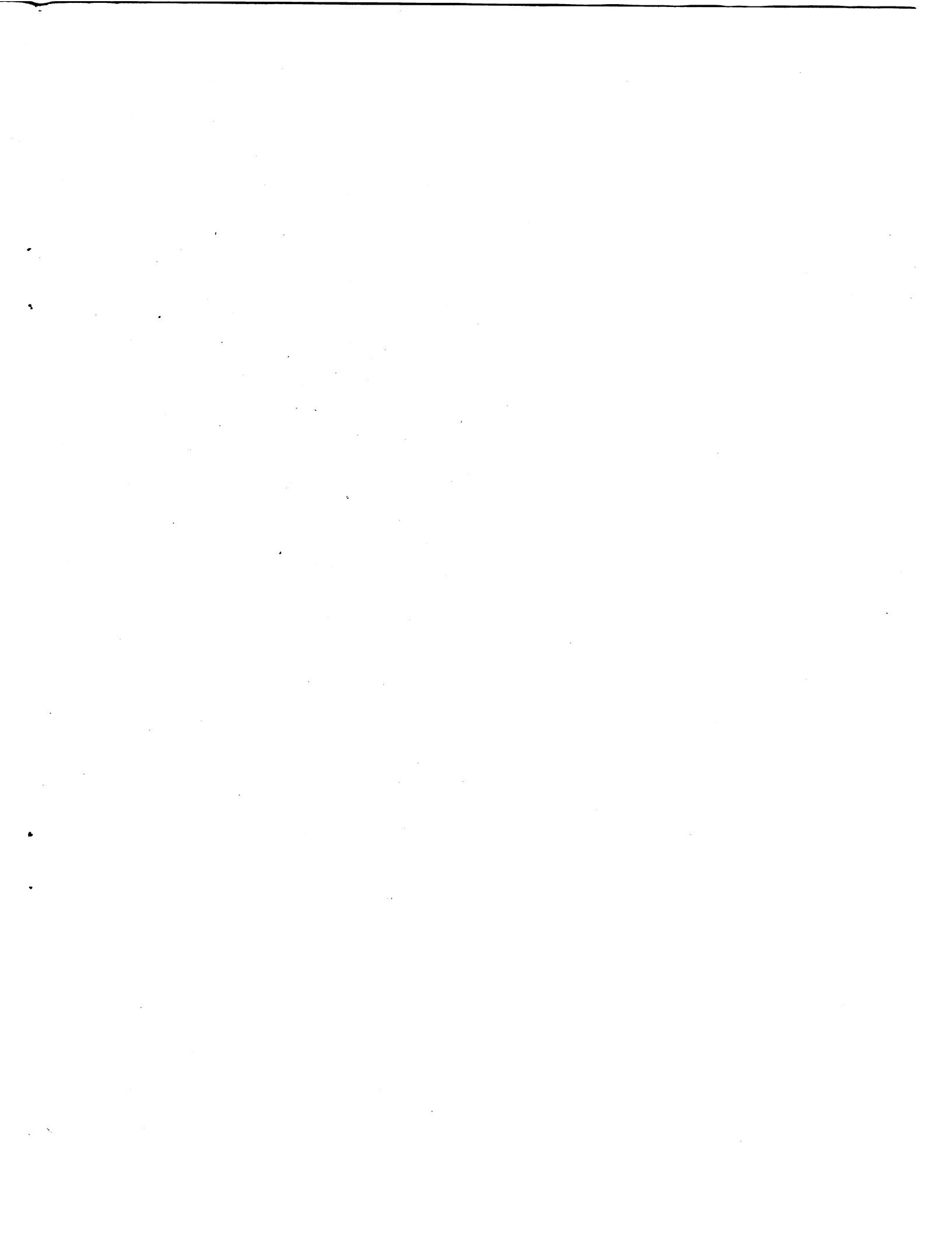
TM4069-27

connected in parallel; some equipments do not use C56.)

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TM 11-4069/TO 16-30PRC6-5

RADIO SET AN/PRC-6 FIELD MAINTENANCE

1952