DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TM 11-2531A

TO 16-30TIQ3-15

PUBLIC ADDRESS SET

AN/TIQ-3A

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

DECEMBER 1952

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER
PUBLIC ADDRESS SET AN/TIQ–3A

TM 11–2531A
TO 31S1–2TIQ3–1
CHANGES No. 1

DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
WASHINGTON 25, D. C., *17 January 1955*

TM 11–2531A/TO 16–30TIQ3–15, 2 December 1952, is changed as follows:

CHAPTER 1

INTRODUCTION

Note. (Added) Audio Frequency Amplifier AM–700A/TIQ–3 is similar to (and interchangeable with) Audio Frequency Amplifier AM–700/TIQ–3 covered in TM 11–2531A except for minor differences which are covered in this change. Information in TM 11–2531A pertaining to the AM–700/TIQ–3 applies also to the AM–700A/TIQ–3 except as indicated otherwise in this change.

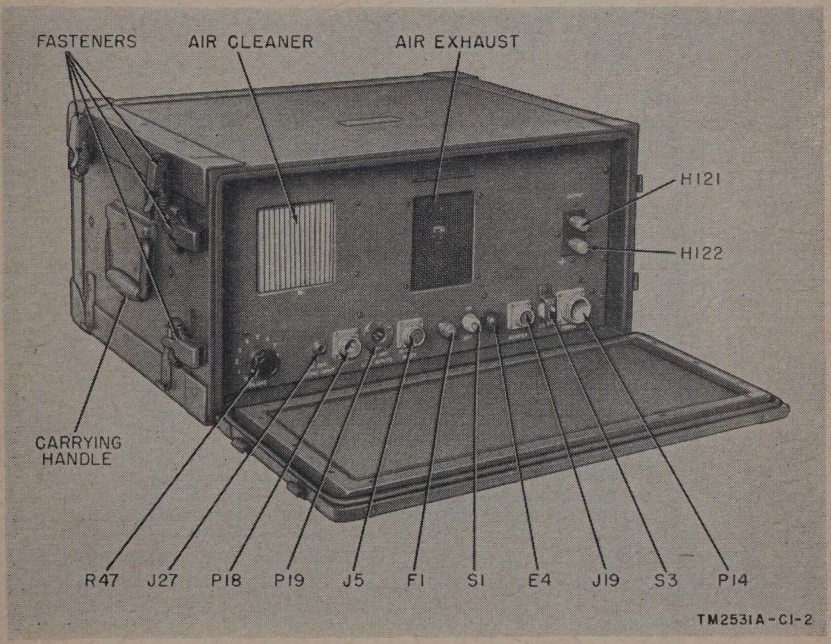


Figure 3.1. (Added) *Audio Frequency Amplifier AM–700A/TIQ–3 and Case CY–38/TIQ–2.*

7. Description of Major Components

* * * * * * *

b. Audio Frequency Amplifier AM–700/TIQ–3 (fig. 3).

* * * * * * *

(2) All controls necessary * * * the front panel. **A high-impedance, phono-input jack (marked HI IMP. PHONO INPUT) and a low-impedance input connector (marked LO IMP LINE INPUTS) have been incorporated in the panel of the AM–700A/TIQ–3 (fig. 3.1).**

* * * * * * *

13. Operation as Public Address Set

* * * * * * *

i. (Added) To broadcast material from a record player or any device that reproduces intelligence and has a high-impedance output, connect the output of that device into the high-impedance input jack (J27) on the front panel of the AM–700A/TIQ–3 (fig. 3.1). This jack is marked

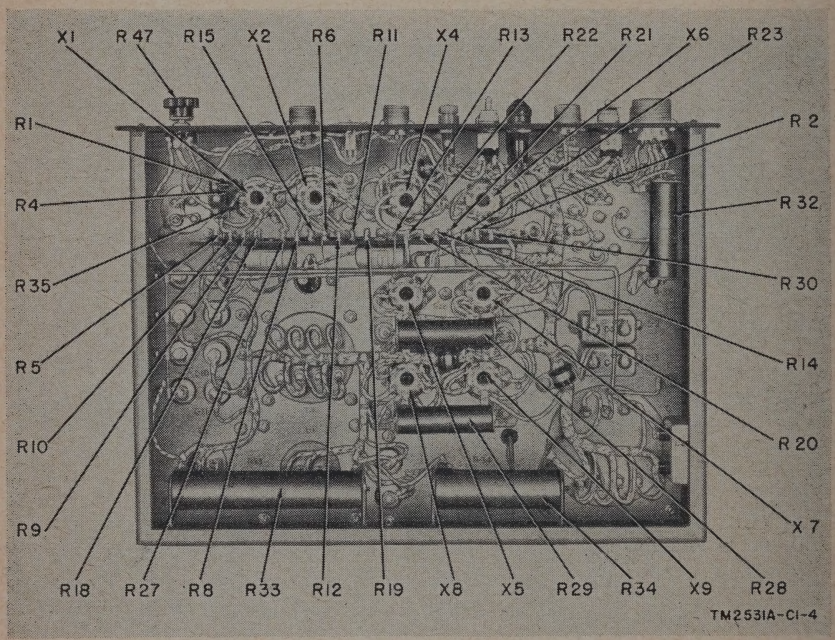


Figure 20.1. (Added) *Audio Frequency Amplifier AM–700A/TIQ–3, bottom view of chassis, identification of resistors and tube sockets.*

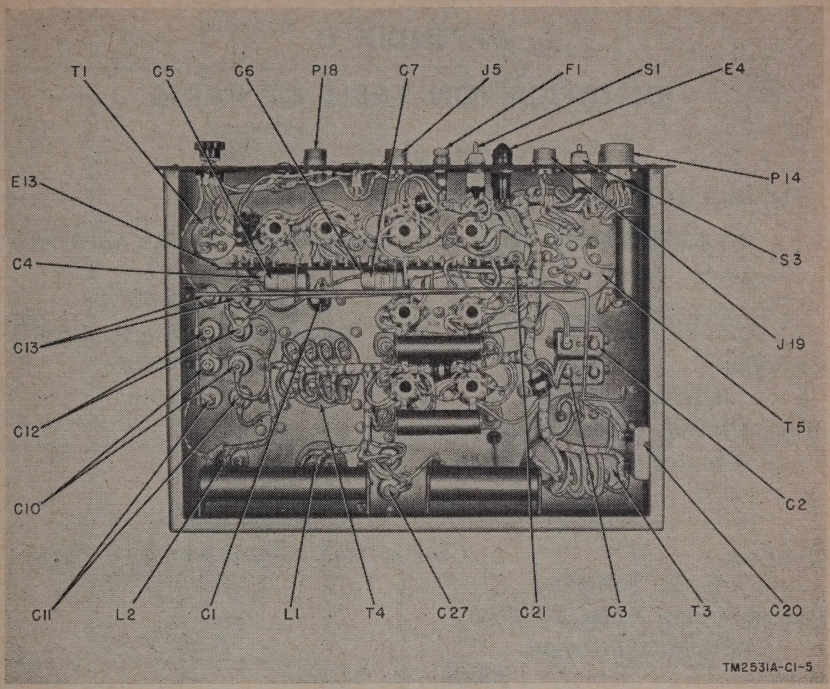


Figure 21.1. (Added) *Audio Frequency Amplifier AM–700A/TIQ–3, bottom view of chassis, identification of parts other than resistors and tube sockets (fig. 20.1).*

HI IMP. PHONO INPUT and the impedance is 25,000 ohms. Operate the amplifier controls as described in *a* through *h* above.

j. (Added) To broadcast intelligence from a telephone line, low-impedance microphones, or from other low-impedance sources, connect these sources through a suitable connector to the male connector (P19) on the front panel of the AM–700A/TIQ–3 (fig. 3.1). The connector is marked LO IMP LINE INPUTS and has an impedance of 100 ohms. Operate the amplifier controls as described in *a* through *h* above.

Note. If the TALK * * * before feedback occurs.

28. Voltage-Amplifier Stage Using Tube V1 (figs. 23 and 23.1)

The audio-output * * * of transformer T1. **On the AM–700A/TIQ–3, the primary and secondary of T1 are shunted by low-impedance connector P19 and high-impedance jack J27 respectively (fig. 23.1). These added inputs provide direct connection to the AM–700A/TIQ–3 input stage and supplement handset input connector J26 which is located on the control panel.** Transformer T1 properly * * * phase-inversion circuit.

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Rescinded

[AG 676.5 (14 Dec 54)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

M. B. RIDGWAY,
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Chief of Staff.

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Major General, United States Army,
The Adjutant General.

N. F. TWINING,
Chief of Staff, United States Air Force.

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Colonel, United States Air Force,
Air Adjutant General.

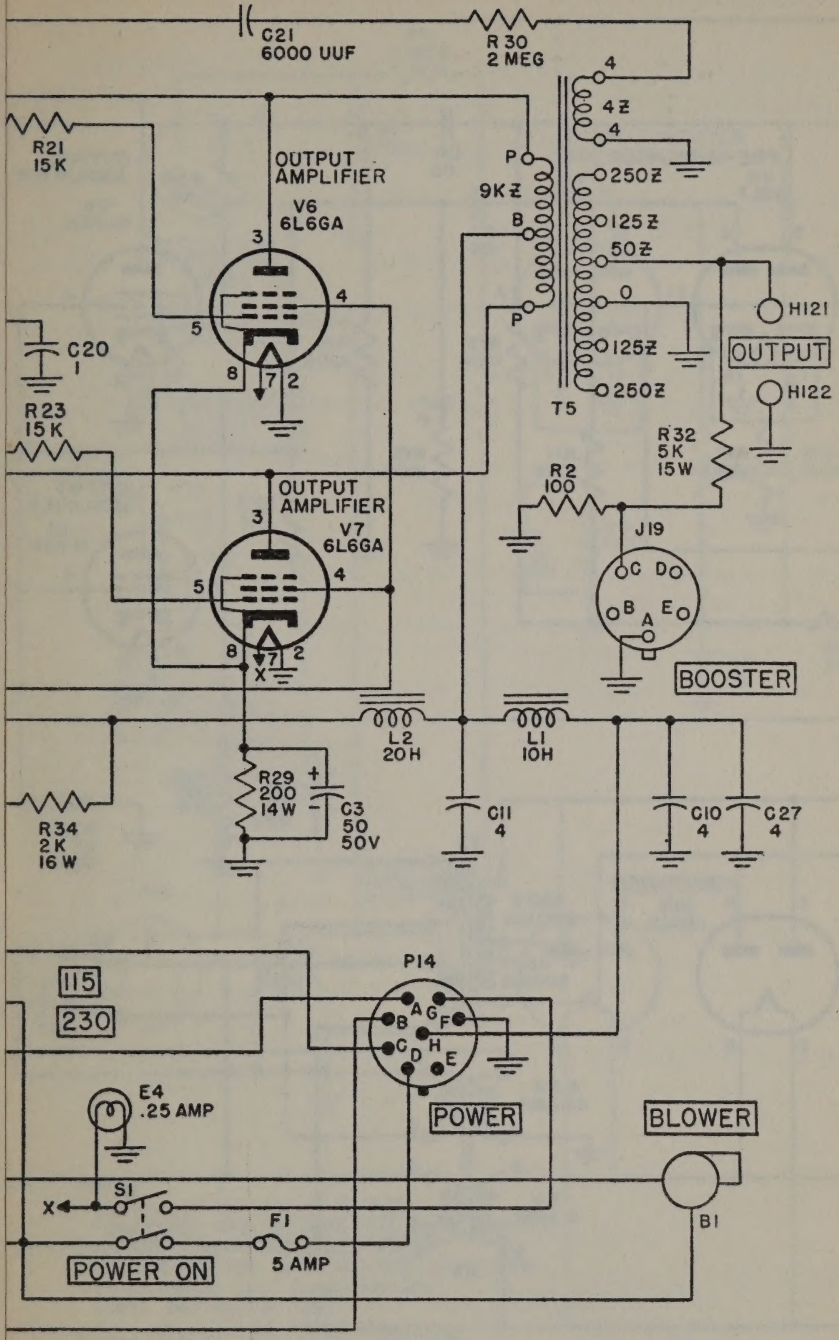
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Log Comd (5)
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Armies (5)
Corps (2)
Tng Div (2)
Ft & Cp (2)
Gen & Br Svc Sch (5)
Sig C Sch (25)
Gen Depots (2)
Sig C Sec, Gen Depots (10)
Sig C Depots (20)
POE (2)
OS Sup Agencies (2)
Sig C Fld Maint Shops (3)
Sig C Lab (5)
Mil Dist (1)
Units organized under following TOE:
8–580A, Evac Hosp (2)
8–590A, Convalescent Cen A, Comz (2)
11–127, Sig Rep Co (2)
11–128A, Sig Depot Co (2)
11–500A (AA–AE), Sig, Admin Teams (2)
11–587A Sig, Base Maint Co (2)
11–592A, Hq & Hq Co, Sig Base Depot (2)
11–597A, Sig Base Depot Co (2)
17–2, Hq Co, Armd Div (2)

NG: None.
USAR: None.
Unless otherwise noted, distribution applies to CONUS and overseas.
For explanation of abbreviations used, see SR 320–50–1.

U. S GOVERNMENT PRINTING OFFICE: 1955—310591


C21
6000 UUF
R30
2 MEG
R21
15K
OUTPUT
AMPLIFIER
V6
6L6GA
4
4Z
4
250Z
125Z
50Z
0
125Z
250Z
P
9KZ
B
P
T5
H121
OUTPUT
H122
C20
1
R23
15K
R32
5K
15W
R2
100
OUTPUT
AMPLIFIER
V7
6L6GA
J19
C D
B A E
BOOSTER
L2
20H
L1
10H
R29
200
14W
C3
50
50V
C11
4
C10
4
C27
4
R34
2K
16W
115
230
P14
A G F
B H
C D E
E4
.25 AMP
POWER
BLOWER
S1
X
F1
5 AMP
POWER ON
B1

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Rescinded

[AG 676.5 (14 Dec 54)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

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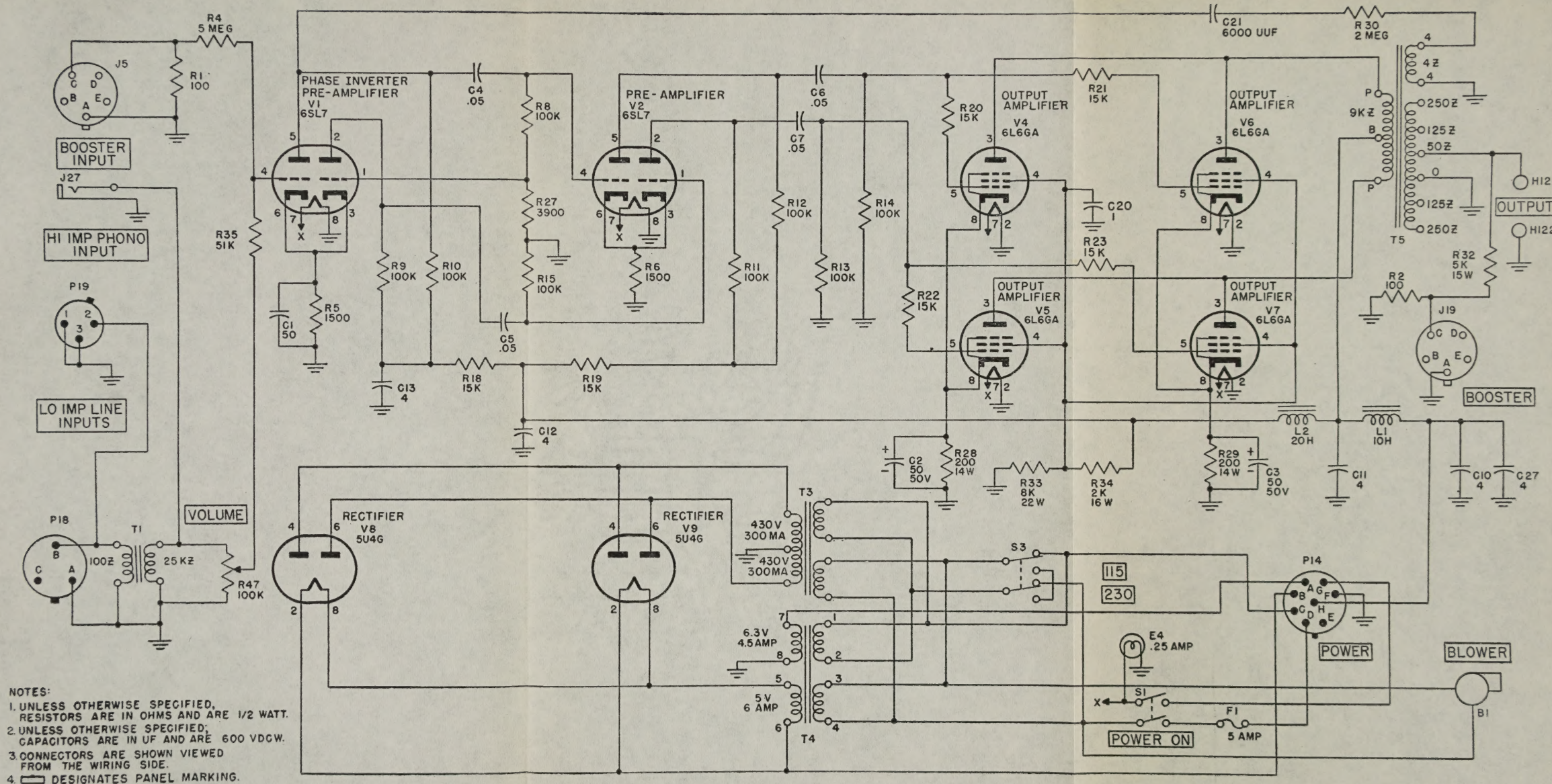
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Log Comd (5)
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Armies (5)
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Tng Div (2)
Ft & Cp (2)
Gen & Br Svc Sch (5)
Sig C Sch (25)
Gen Depots (2)
Sig C Sec, Gen Depots (10)
Sig C Depots (20)
POE (2)
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Sig C Fld Maint Shops (3)
Sig C Lab (5)
Mil Dist (1)
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8–590A, Convalescent Cen A, Comz (2)
11–127, Sig Rep Co (2)
11–128A, Sig Depot Co (2)
11–500A (AA–AE), Sig, Admin Teams (2)
11–587A Sig, Base Maint Co (2)
11–592A, Hq & Hq Co, Sig Base Depot (2)
11–597A, Sig Base Depot Co (2)
17–2, Hq Co, Armd Div (2)

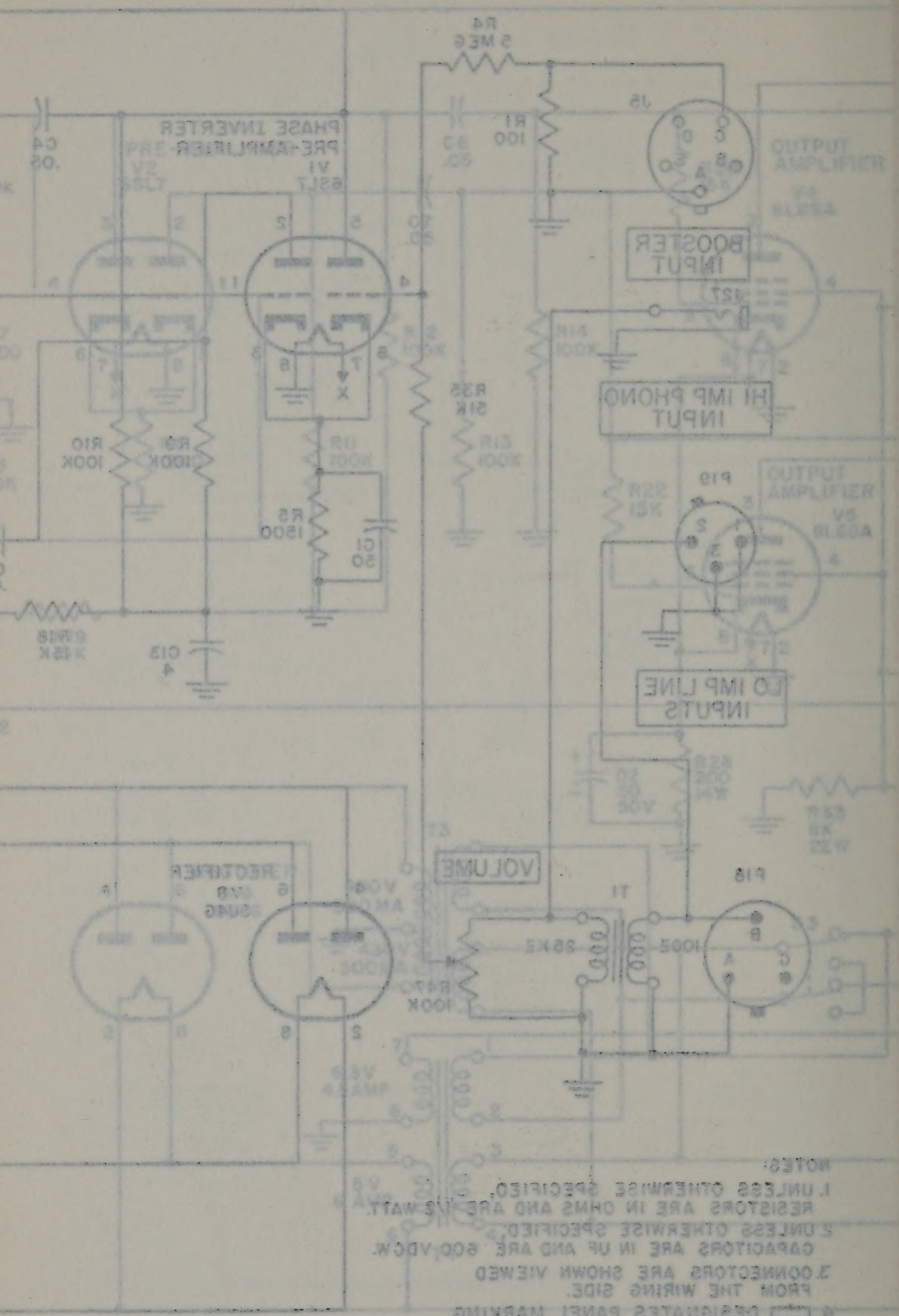
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For explanation of abbreviations used, see SR 320–50–1.

U. S GOVERNMENT PRINTING OFFICE: 1955—310591



NOTES:
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS AND ARE 1/2 WATT.
2. UNLESS OTHERWISE SPECIFIED, CAPACITORS ARE IN UF AND ARE 600 VDCW.
3. CONNECTORS ARE SHOWN VIEWED FROM THE WIRING SIDE.
4. ▭ DESIGNATES PANEL MARKING.

Figure 23.1. (Added) *Audio Frequency Amplifier AM-700A/TIQ-3, schematic diagram.*



NOTES:
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS AND ARE ½ WATT.
2. UNLESS OTHERWISE SPECIFIED, CAPACITORS ARE IN UF AND ARE 600 VDCW.
3. CONNECTORS ARE SHOWN VIEWED FROM THE WIRING SIDE.
4. DESIGNATES PANEL MARKING.

Figure 25.1. (Added) Audio Frequency Amplifier AM-7644/TTQ-3, schematic diagram.

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

PUBLIC ADDRESS SET AN/TIQ-3A

TM 11-2531A
TO 31S1-2TIQ3-1
CHANGES No. 2

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON 25, D. C., *26 October 1956*

TM 11-2531A/TO 31S1-2TIQ3-1, 2 December 1952, is changed as follows:

The following information changes TM 11-2531A/TO 31S1-2TIQ3-1 so that the manual also applies to the following equipment:

Nomenclature	*Order No.*	*Serial No.*
Public Address Set AN/TIQ-3A	38717-Phila-56	1 through 50

Page 1, chapter 1 (C 1). Designate the existing note as "1." and add the following note:

Note 2. Public Address Set AN/TIQ-3A procured on Order No. 38717-Phila-56 is similar to the AN/TIQ-3A covered in this manual. All information in this manual applies to the AN/TIQ-3A (Order No. 38717-Phila-56) except as indicated otherwise in Changes No. 2.

Change P19 to read *P20* in the following places in the manual:

Page 12, figure 8.
Page 14, paragraph 7*l*.
Page 14, figure 10.
Page 29, paragraph 10*h*.
Page 30, figure 14.
Page 47, paragraph 43. Third line of possible cause column.
Page 52, paragraph 52*a*.

Change Audio Oscillator TS-421/U to read **Audio Oscillator TS-382/U** in the following places:

Page 53, paragraph 54.
Page 53, paragraph 55*a*.

Change Electronic Multimeter ME-6/U or ME-6/U to read **Voltmeter ME-30A/U** in the following places:

Page 53, paragraph 54.
Page 53, paragraph 55*b*.
Page 53, paragraph 55*d*.
Page 54, paragraph 55*g*.

Page 4 (C 1), figure 23.1. Add the following note.

NOTE. On the AM-700A/TIQ-3 (ORDER NO. 38717-PHILA-56), BLOWER MOTOR B1 IS A CAPACITOR-START TYPE.

Page 30, figure 14. Add the following note.

NOTE. ON THE C–1090/TIQ–3 (ORDER NO. 38717–PHILA–56), CAPACITOR C26 IS 470 UUF.

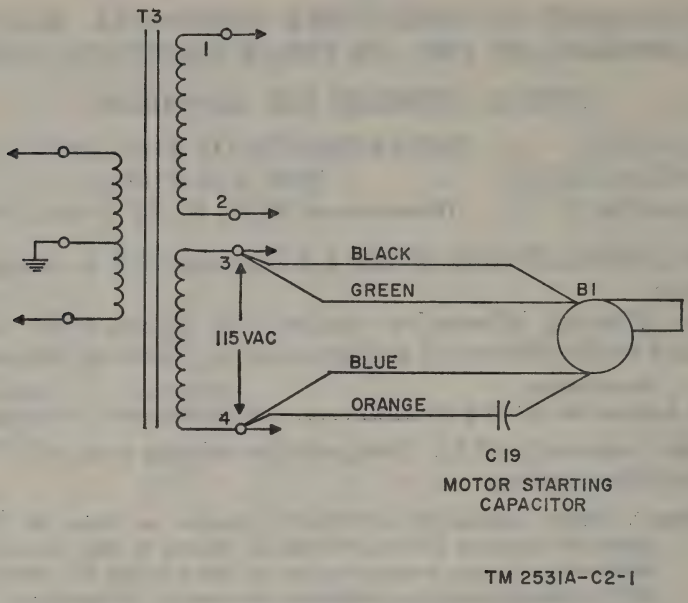


Figure 14.1. (Added) *Blower motor circuit, AM–700A/TIQ–3 (38717–Phila–56).*

Page 33, paragraph 27*b*. In the first line, change ouptut to read: **output.**

Page 40, figure 22. Add the following note.

NOTE. ON THE C–1090/TIQ–3 (ORDER NO. 38717–PHILA–56), THE VALUES OF CAPACITORS C18 AND C26 ARE 390 UUF AND 470 UUF, RESPECTIVELY.

Page 41, paragraph 34. Add the following. On the AM–700A/TIQ–3 (Order No. 38717–Phila–56), the blower motor is the capacitor-start type and uses a separate starting capacitor (C19), (fig. 14.1).

Page 53, paragraph 54. Change Variac General Radio (750 watts) to read: **Variable Power Transformer CN–16/U.**

[AG 676.5 (23 Oct 56)]

By Order of the Secretaries of the Army and the Air Force:

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Units org under fol TOE:
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8–590R (2)
11–7C (2)
11–16C (2)
11–57C (2)
11–127R (2)
11–128C (2)
11–500R (2)
11–557C (2)
11–587R (2)
11–592R (2)
11–597R (2)
17–2C (2)

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USAR: None.

For explanation of abbreviations used, see SR 320–50–1.

U. S. GOVERNMENT PRINTING OFFICE: 1956

TM 11-2531A/TO 16-30TIQ3-15

PUBLIC ADDRESS SET

AN/TIQ-3A





United States Government Printing Office
Washington : 1952

DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
Washington 25, D. C., *2 December 1952*

TM 11-2531A/TO 16-30TIQ3-15 is published for the information and guidance of all concerned.

[AG 676.5 (25 Sep 52)]

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

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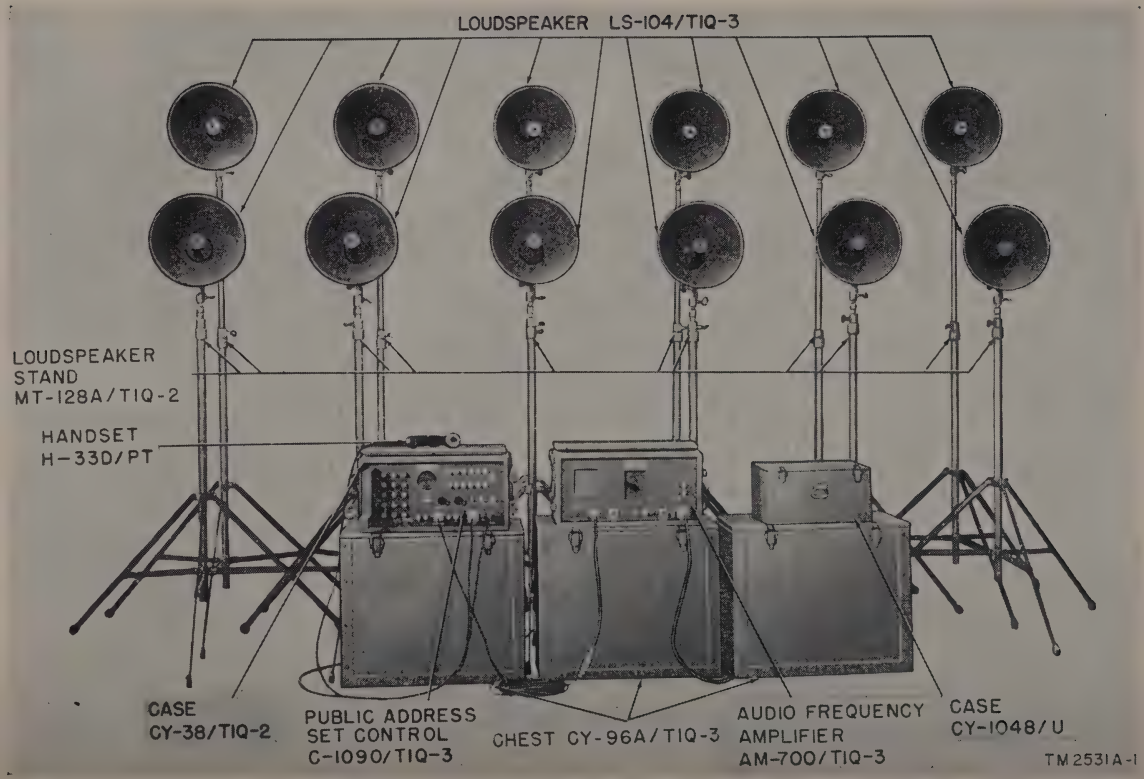


Figure 1. Public Address Set AN/TIQ–3A.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of the personnel to whom this equipment is issued. They contain a physical description of the equipment, operating instructions, organizational maintenance information, the theory of operation, repair instructions, repacking instructions for shipment or limited storage, and instructions for demolishing the equipment to prevent enemy use. These instructions apply only to Public Address Set AN/TIQ-3A.

b. Appendix I contains a list of current references, including supply catalogs, technical manuals, and other available publications applicable to the equipment. Appendix II contains an identification table of parts.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army equipment and in performing preventive maintenance:

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army) and AFR 71-4 (Air Force).

b. DA 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 11-250, Operator First Echelon Maintenance Check List for Signal Corps Equipment, Public Address, Recorder, Reproducers, will be prepared in accordance with instructions on the back of the form.

d. DA AGO Form 11-251, Second and Third Echelon Maintenance Check List for Signal Corps Equipment, Public Address, Recorder, Reproducer, 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. General

Public Address Set AN/TIQ-3A (fig. 1) is a portable public address system designed to cover a large area. The system consists of Public Address Set Control C-1090/TIQ-3, Audio Frequency Amplifier AM-700/TIQ-3, Power Unit PE-214-( ), Handset H-33D/PT, and 12 Loudspeakers LS-104/TIQ-3. Handset H-33D/PT, or a monitor speaker on the control unit, permits two-way communication through selected loudspeakers, or it may be used to communicate with personnel

over the entire system. Tone generators provide a constant, intermittent, or warble tone which may be sent over the system for signaling purposes.

Note. Power Unit PE–214–( ) designates all models of this equipment.

4. Technical Characteristics

Input volts	115 or 230 volts ac.
Line frequency	60 cps.
Power consumed:	
Amplifier	300 w.
Control unit	50 w.
Current required:	
Amplifier	2.5 amp.
Control unit	0.5 amp.
Power output	50 w, at less than 15 percent distortion.
Frequency range	50 to 15,000 cyc.
Tubes, type and function	6SL7 (V1) phase inverter and preamplifier.
	6SL7 (V2) preamplifier.
	6SL7 (V3) preamplifier (control unit).
	6L6GA (V4) power output amplifier.
	6L6GA (V5) power output amplifier.
	6L6GA (V6) power output amplifier.
	6L6GA (V7) power output amplifier.
	5U4G (V8) rectifier.
	5U4G (V9) rectifier.
	5U4G (V10) rectifier (control unit).
	VR105 (V11) voltage regulator (control unit).
Loudspeaker:	
Type	Permanent-magnet, re-entrant type.
Power	25 w.
Voice coil impedance	15 ohms.
Transformer	15-ohm secondary, primary-tapped for 0–250–500–1,000–2,500 ohms.
Handset	Receiver impedance, 300 ohms, transmitter impedance, 60 ohms.

5. Packaging Data

a. Table of Packaging Weights.

Case No.	Component	Weight (pounds) contents only	Weight (pounds) packing material only	Total weight (pounds)	Volume (cubic feet)
4 of 9	Case CY–38/TIQ–2 and Audio Frequency Amplifier AM–700/TIQ–3	95. 00	49. 00	144. 00	4. 4
5 of 9	Case CY–38/TIQ–2 and Public Address Set Control C–1090/TIQ–3	64. 25	47. 00	111. 25	4. 4
2 of 9	Chest CY–96A/TIQ–3 and Loudspeakers LS–104/TIQ–3	127. 50	73. 00	200. 50	9. 2
3 of 9	Chest CY–96A/TIQ–3 and Loudspeakers LS–104/TIQ–3	127. 50	73. 00	200. 50	9. 2
1 of 9	Chest CY–96A/TIQ–3 and Loudspeakers LS–104/TIQ–3 and Electrical Special Purpose Case CY–1048/U, running spare parts, cords, and telephone handset.	153. 00	73. 00	226. 00	9. 2
8 of 9	Loudspeaker Stand MT–128A/TIQ–2 (6 in case)	120. 00	60. 00	180. 00	13. 0
9 of 9	Loudspeaker Stand MT–128A/TIQ–2 (6 in case)	120. 00	60. 00	180. 00	13. 0
6 of 9 and 7 of 9.	Power Unit PE–214–( )	60. 75			
	Total	868. 00	435. 00	1, 242. 25	62. 4

b. Method of Packaging (fig. 11).

(1) Each component, in its wooden chest, is placed in an inner corrugated carton which is sealed and then marked. This carton then is placed in a moisture-vaporproof barrier, from which the air is evacuated; the barrier is heat-sealed. The sealed component then is placed in an outer corrugated carton which is sealed with a pressure-sensitive tape. This outer carton then is placed in a moistureproof barrier which then is sealed. The component then is placed into a wooden case which is nailed and strapped with steel bands.

(2) Each speaker stand is placed in a corrugated carton and sealed. Six of these cartons then are placed in a wooden case containing a waterproof case liner which then is sealed; the box is nailed, strapped, and marked.

6. Table of Components

Quantity	Name of component	Dimensions (inches)				Unit weight (pounds)
		Height	Width	Depth	Length	
1	Audio Frequency Amplifier AM–700/TIQ–3	8¾	19	13		70½
1	Public Address Set Control C–1090/TIQ–3	8¾	19	13		39¾
2	Cord CX–49/TIQ–2 (W1 and W2)				120	1¼
1	Electrical Special Purpose Cable Assembly CX–1931/U (W3)				18	¼
1	Cord CX–53/TIQ–2 (W4)				300	4½
2	Cord CX–54/TIQ–2 (W5 and W6)				300	2½
1	Cord CX–55/TIQ–2 (W7)				36	½
2	Electrical Special Purpose Cable Assembly CX–1833/U (W8 and W9).				300	1¼
1	Electrical Special Purpose Cable Assembly CX–1815/U (W10)				300	2
1	Case CY–38/TIQ–2, marked AMPLIFIER	10¾	22	17		24½
1	Case CY–38/TIQ–2, marked CONTROL UNIT	10¾	22	17		24½
1	Electrical Special Purpose Case CY–1048/U, containing the cords and cables and the following running spare parts:	8	15	12		25½
	4 Lamps LM–27 (E3 and E4).					
	2 tubes 6SL7 (V1, V2, and V3).					
	2 tubes 6L6GA (V4, V5, V6, and V7).					
	2 tubes 5U4G (V8, V9, and V10).					
	6 fuses, 5-amp, 250-volt, type 3AG (F1).					
	6 fuses, 1-amp, 250-volt (F2).					
	1 tube OC3/VR–105 (V11).					
	2 neon lamps, ¼-w, 105- to 125-volt (E1 and E2).					
	1 air filter.					

3	Chest CY–96A/TIQ–3, containing loudspeakers	12¾	27	17⅞		127½
2	Canvas cover for power unit.					
1	Handset H–33D/PT, complete with cord W11				96	
12	Loudspeaker LS–104/TIQ–3	13⅝	15½			20¼
1	Power Unit PE–214–( )	12 1⅞16	14⅛	17¾		60¾
12	Loudspeaker Stand MT–128A/TIQ–2	54				20

Note 1. Field wire WD–1/TT, required to connect loudspeakers to control unit, is not furnished with Public Address Set AN/TIQ–3A.

Note 2. The table of components, shown above, is for general information only. See appropriate supply publications for information pertaining to requisition of spare parts.

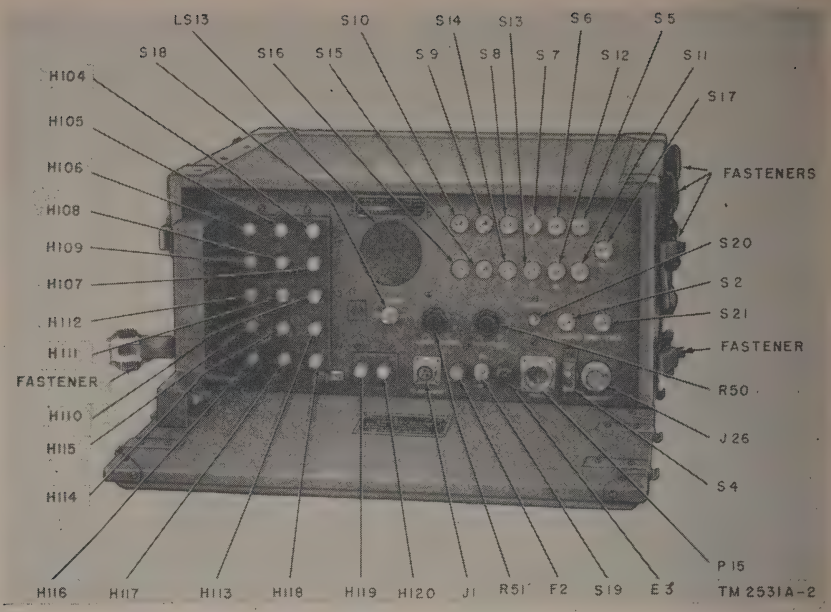


Figure 2. Public Address Set Control C–1090/TIQ–3 and Case CY–38/TIQ–2.

7. Description of Major Components

a. Public Address Set Control C–1090/TIQ–3 (fig. 2). This control unit consists of a preamplifier, three-tone generators, a power supply, and a control circuit for distributing the output of the amplier. The preamplifier steps up the signal from any one of three sources: the sound input from the handset; the signal from the constant, intermittent, or warble-tone generators; or the sound input from any one of the loudspeakers when the intercommunication feature is used (par. 14). Tube 6SL7 (V3) is used as the preamplifier and tube 5U4G (V10) is the rectifier (fig. 24).

(1) The control unit is mounted in Case CY–38/TIQ–2 marked CONTROL UNIT. The case is constructed of plywood, heavily reinforced with a steel frame and steel corners. The removable cover of the case is secured with catch fasteners.

(2) A neoprene weatherproof gasket is fastened to the front cover to protect the control unit against moisture, but it does not protect the unit in event of immersion in water. Carrying handles and catch fasteners are attached to the sides of the case.

b. Audio Frequency Amplifier AM–700/TIQ–3 (fig. 3).

(1) This amplifier has an output of 50 watts at less than 10 percent distortion and is used to amplify further the output of the control unit preamplifier. The amplifier uses the

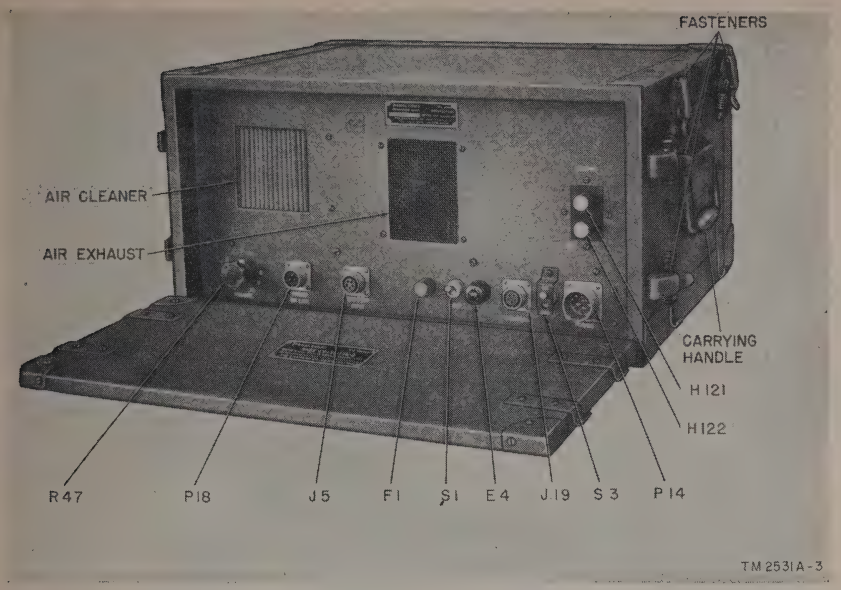


Figure 3. Audio Frequency Amplifier AM–700/TIQ–3 and Case CY–38/TIQ–2.

following tubes: a 6SL7 (V1) as a phase-inverter and first preamplifier; a 6SL7 (V2) as a second preamplifier; and four 6L6GA (V4, V5, V6, and V7) as power amplifiers in a push-pull parallel circuit. Two 5U4G tubes (V8 and V9) are used as rectifiers. All tubes are air-cooled by means of an electric blower.

(2) All controls necessary for the operation of the unit are mounted on the front panel.

(3) The entire unit is mounted in Case CY–38/TIQ–2 which is identical with the case containing the control unit.

c. Electrical Special Purpose Case CY–1048/U (fig. 4). This case is designed to house the running spare parts and all operating accessories (except Loudspeaker LS–104/TIQ–3). It is mounted in one of the Chests CY–96A/TIQ–3.

d. Chest CY–96A/TIQ–3 (fig. 6).

(1) There are three cases of this type used with Public Address Set AN/TIQ–3A. Each case holds four Loudspeakers LS–104/TIQ–3.

(2) The case is constructed of plywood, heavily reinforced with a steel frame and steel corners. A hinged lid secured by catch fasteners covers the case. A stay chain on each side of the lid protects the hinges.

(3) A neoprene gasket, fastened around the inside of the lid, protects the equipment from moisture, but not from immer-

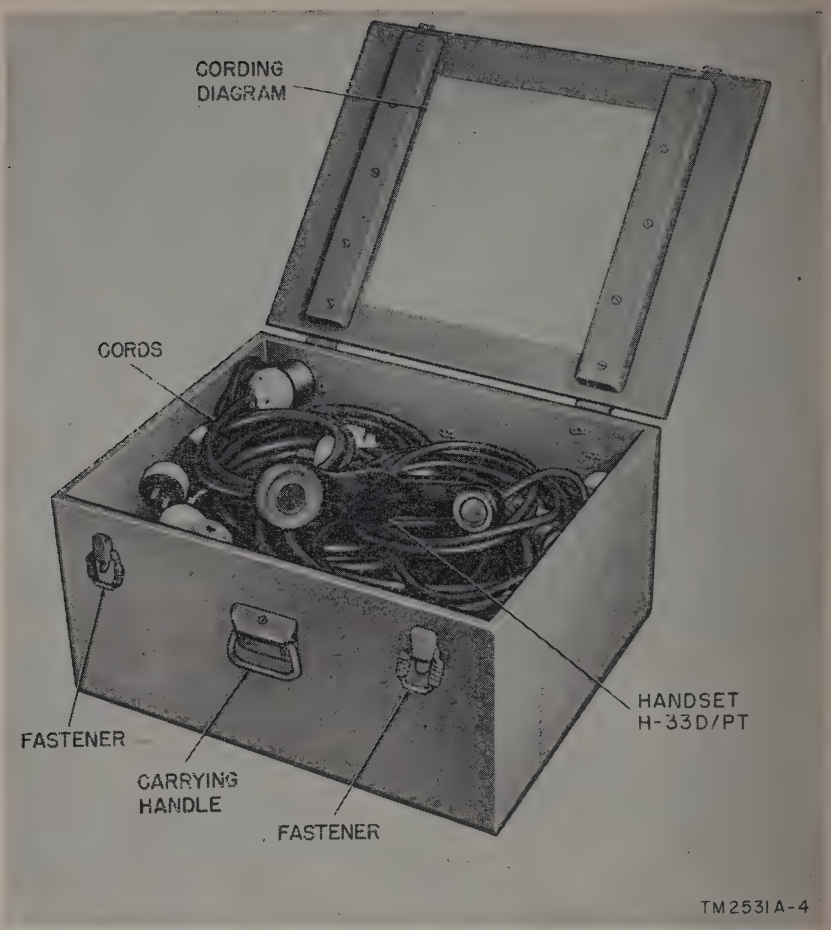


Figure 4. Electrical Special Purpose Case CY–1048/U.

sion. A folding casket-type handle is attached to each side of the case for carrying.

(4) Four compartments, each of which houses a speaker-driver unit, and another compartment, which contains the nested horns of the four loudspeakers, divide the case interior. Four wooden rings on the inside of the case lid secure the driver units in place. A spring attached to the bottom of the case is equipped with a crossbar which holds down the horns. The accessories case is stored in one of the three loudspeaker cases, mounted above the horn-nesting compartment as shown in figure 6.

e. Cord CX–49/TIQ–2, A-C Power Cords (W1 and W2) (figs. 7 and 10).

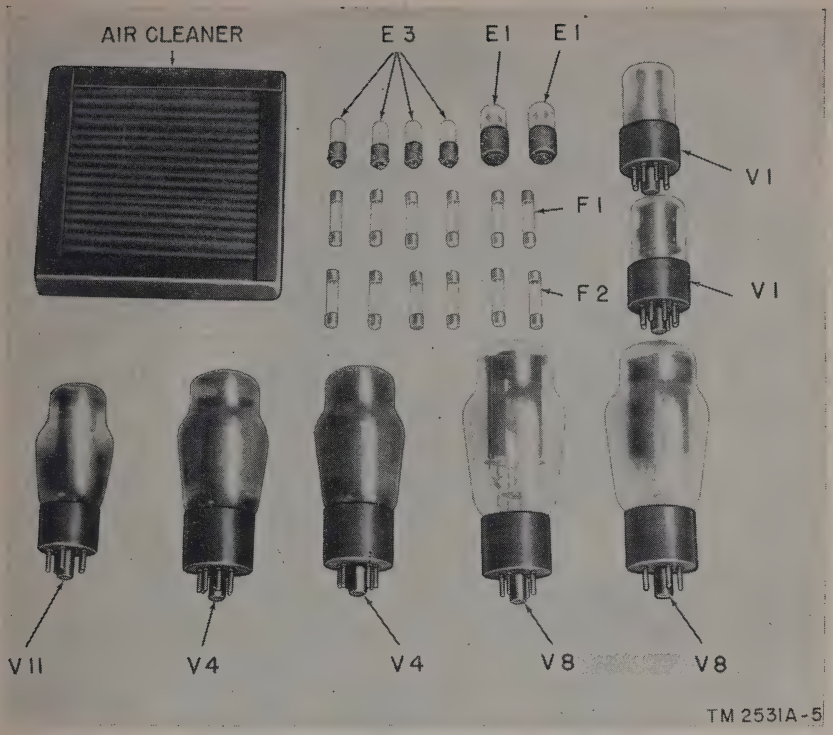


Figure 5. Public Address Set AN/TIQ–3A, running spare parts.

(1) Cord CX–49/TIQ–2 (W1) is stored in the accessories case. This cord consists of 10 feet of two-conductor cable and is terminated at one end by female connector J10 which mates with male connector P15 on the front panel of the control unit. The other end of this cord is terminated by plug P10 which mates with receptacle J12, J13, J14, or J15 in the junction box on power extension Cord CX–53/TIQ–2 (W4).

(2) Cord CX–49/TIQ–2 (W2) is stored in the accessories case. This cord consists of 10 feet of two-conductor cable, terminated at one end by female connector J11 which mates with connector P14 on the front panel of the amplifier unit. The other end of this cord is terminated by plug P9 which mates with receptacle J12, J13, J14, or J15 in the junction box on power extension Cord CX–53/TIQ–2 (W4).

f. Cord CX–53/TIQ–2, Power Extension Cord (W4) (figs. 7 and 10). Cord W4 is stored in the accessories case. This cord is a 25-foot, rubber-covered, two-conductor cable, terminated at one end by a junction box containing receptacles J12, J13, J14, and J15, into which plug P10 on control unit power cord W1, and plug P9 on amplifier power cord W2 may be inserted. The two remaining receptacles are

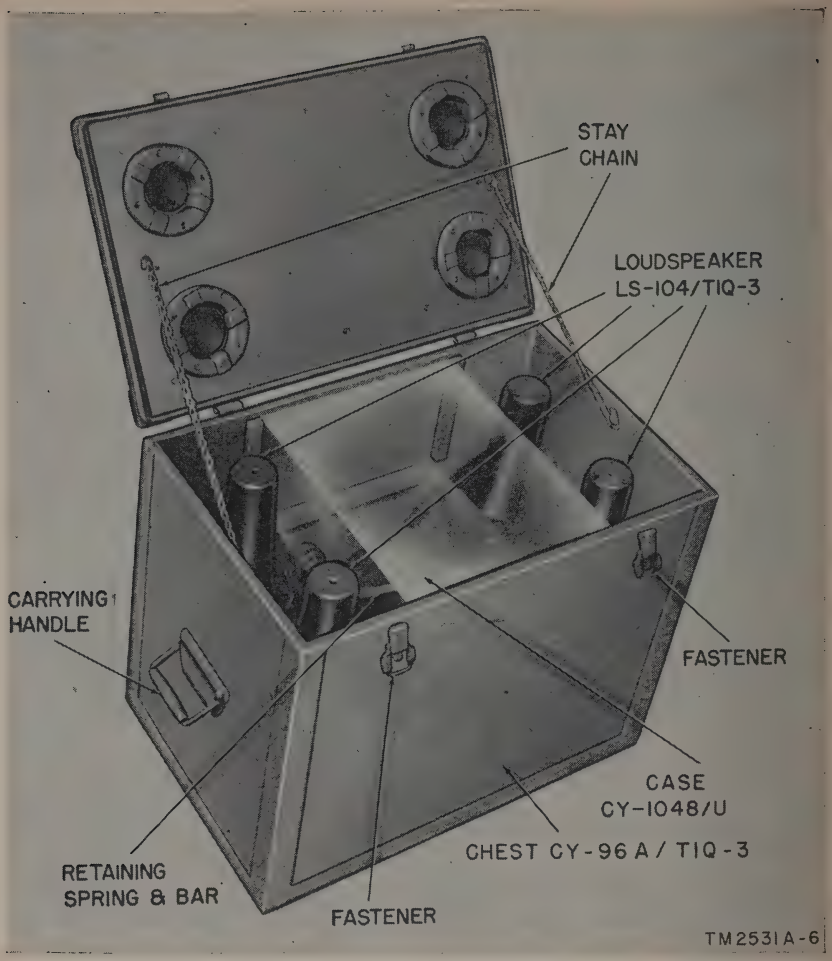


Figure 6. Chest CY–96A/TIQ–3 and Loudspeakers LS–104/TIQ–3.

spares. The other end of cord W4 is terminated by plug P13 which may be connected directly to the power output connector on Power Unit PE–214–( ), or to the female connector on any one of the power extension cords, W5, W6, or W7.

g. Cord CX–54/TIQ–2, Power Extension Cords (W5 and W6) (figs. 7 and 10).

(1) Cord CX–54/TIQ–2 (W5) is stored in the accessories case. This is a 25-foot, rubber-covered, two-conductor cable, terminated at one end by female connector J18 which mates with plug P13 on power cord W4. The other end of cord W5 is terminated by plug P12 which may be connected directly to the power unit, or to the female connector on power extension cord W6.

(2) Cord CX–54/TIQ–2 (W6) is stored in the accessories case. This is a 25-foot, rubber-covered, two-conductor cable, terminated at one end by female connector J17 which mates with plug P12 on power extension cord W5. The other end of cord W6 is terminated by plug P11 which may be connected directly to the power unit, or to female connector J16 on cord W7.

h. Cord CX–55/TIQ–2, Power Connection Adapter Cord (W7) (figs. 7 and 10). Cord W7 is stored in the accessories case. This cord is a 3-foot, rubber-covered, two-conductor cable, terminated at one end by female connector J16 which mates with plug P13 on power cord W4, plug P12 on power extension cord W5, or plug P11 on power extension cord W6. The purpose of this cord is to provide for suitable connection to a commercial a-c (alternating-current) receptacle by use of plug P16.

i. Electrical Special Purpose Cable Assembly CX–1931/U (W3) (figs. 7 and 10). This cable is stored in the accessories case. It is a 1½-foot, rubber-covered, single-conductor, shielded cable, terminated at one end by connector J7 which mates with connector P18 on the amplifier front panel. The other end of cord W3 is terminated by connector P7 which mates with connector J1 on the control unit front panel, or to connectors J6 or J25 on cable W8 or W9. Cables W8 and W9 extend cable W3 up to 50 feet.

j. Electrical Special Purpose Cable Assembly CX–1815/U (W10) (figs. 7 and 10). Cord W10 is stored in the accessories case. This

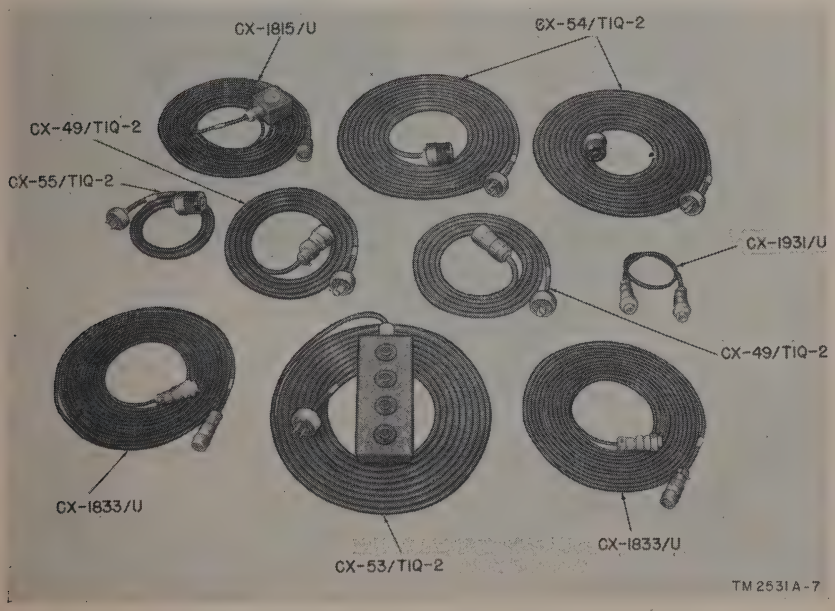


Figure 7. Public Address Set AN/TIQ–3A, cords.

cord is a 25-foot, rubber-covered, four-conductor, shielded cable, terminated at one end by a junction box containing connector J24. The other end of cord W10 terminates in connector P17 which mates with connector J26 on the control unit. This cord is used to extend the handset cord.

k. Electrical Special Purpose Cable Assembly CX-1833/U (W8 and W9) (figs. 7 and 10).

(1) Cord W8 is stored in the accessories case. This extension cord is a 25-foot, rubber-covered, single-conductor, shielded cable, terminated at one end by connector P6 which mates with J1 on the control unit panel. The other end of cord W8 is terminated by connector J6 which may be connected to connector P7 on cord W3.

(2) Cord W9 is stored in the accessories case. This extension cord is a 25-foot, rubber-covered, single-conductor, shielded cable, terminated at one end by connector J25 which mates with connector P6 of W8. The other end of cord W9 is terminated by connector P8 which may be connected to

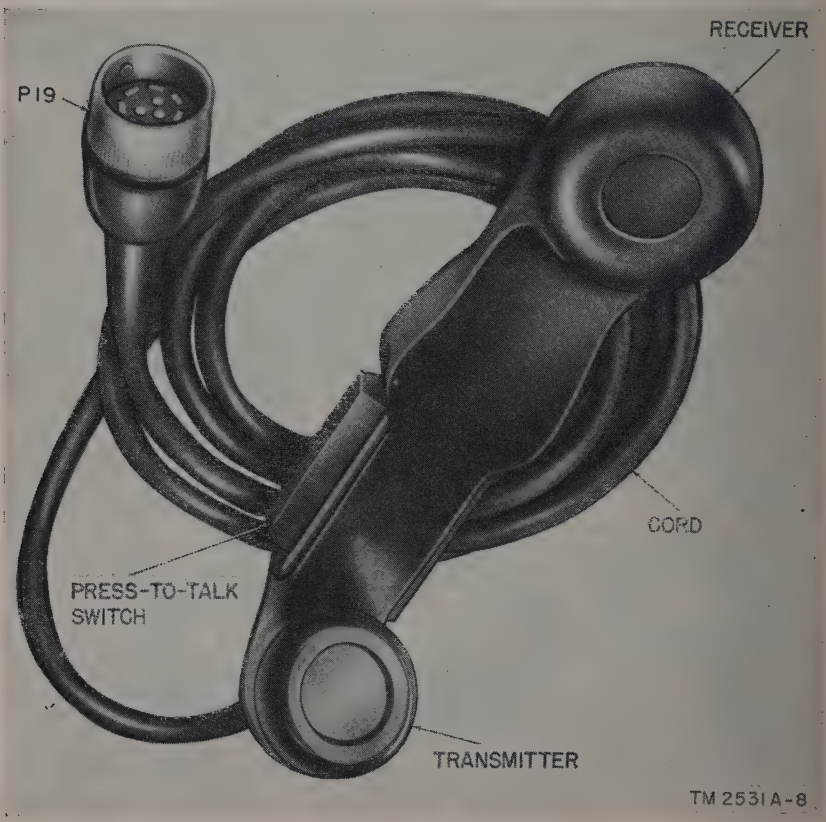


Figure 8. Handset H–33D/PT.

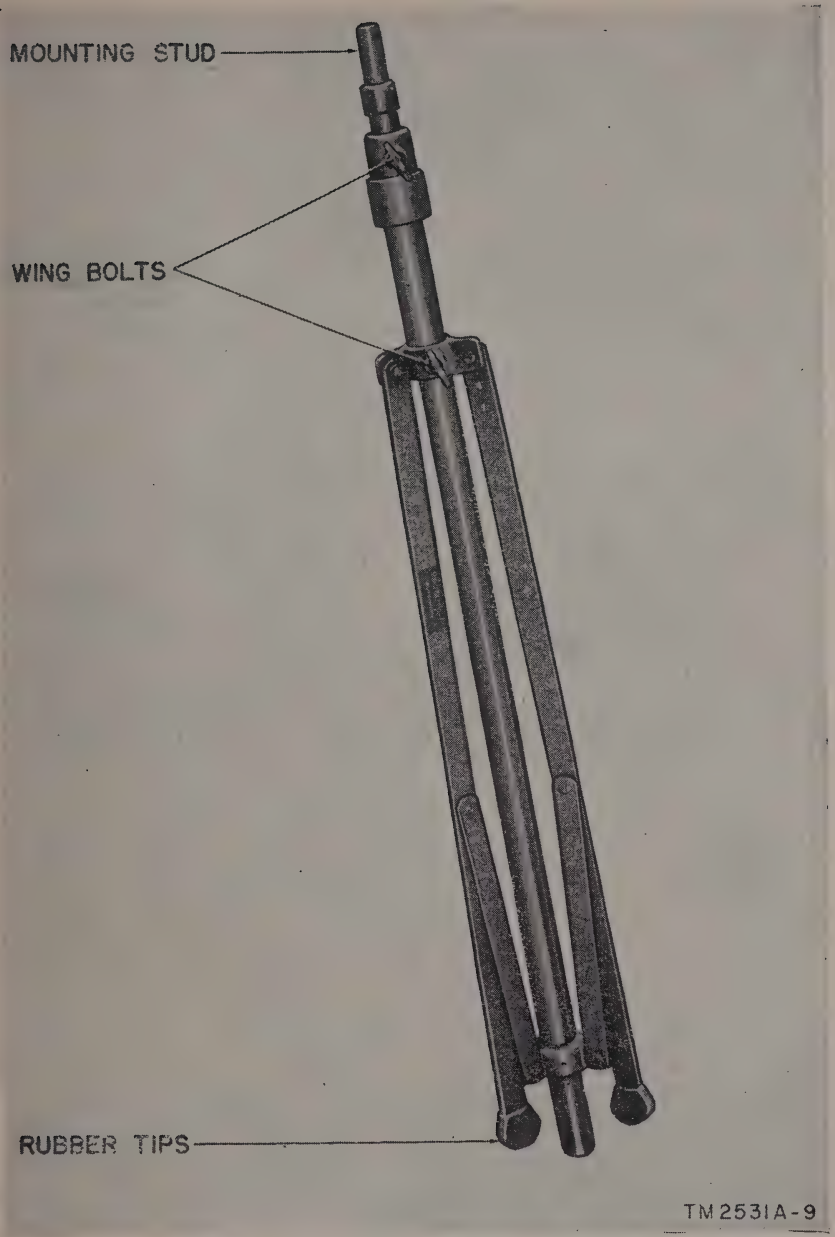


Figure 9. Loudspeaker Stand MT–128A/TIQ–2.

connector J1 of the control unit panel, thus providing additional extension for cords W3 and W8.

l. Handset H-33D/PT (figs. 8 and 10). This handset consists of a microphone which converts the acoustical power of the operator's voice into electrical energy, and a receiver which converts the audio

power output of the amplifier into sound. A press-to-talk switch, located on the handle, completes the microphone and relay circuits. Cord W11 is attached to the handset and terminates in connector P19 which connects with connector J26 on the control unit, or to connector J24 of cord W10 if an extension is desired.

m. Loudspeaker Stand MT-128A/TIQ-2 (figs. 9 and 12). The loudspeaker stand is made of steel and is painted olive drab. It has a tripod-type collapsible base. The stand, when closed, measures 3 feet 10 inches high and can be adjusted to a height of 7 feet 6 inches. A $^{13}/_{16}$-inch diameter unthreaded stud is provided for mounting and supporting Loudspeaker LS–104/TIQ–3. The tip of each leg is provided with a rubber covering to prevent skidding. The height of the tripod is adjustable and is locked in place with a wingnut. The adjustable center post of the stand is locked in place with a wingnut.

n. Loudspeaker LS–104/TIQ–3 (fig. 12).

(1) The speaker is of the reflex type in which the sound travels

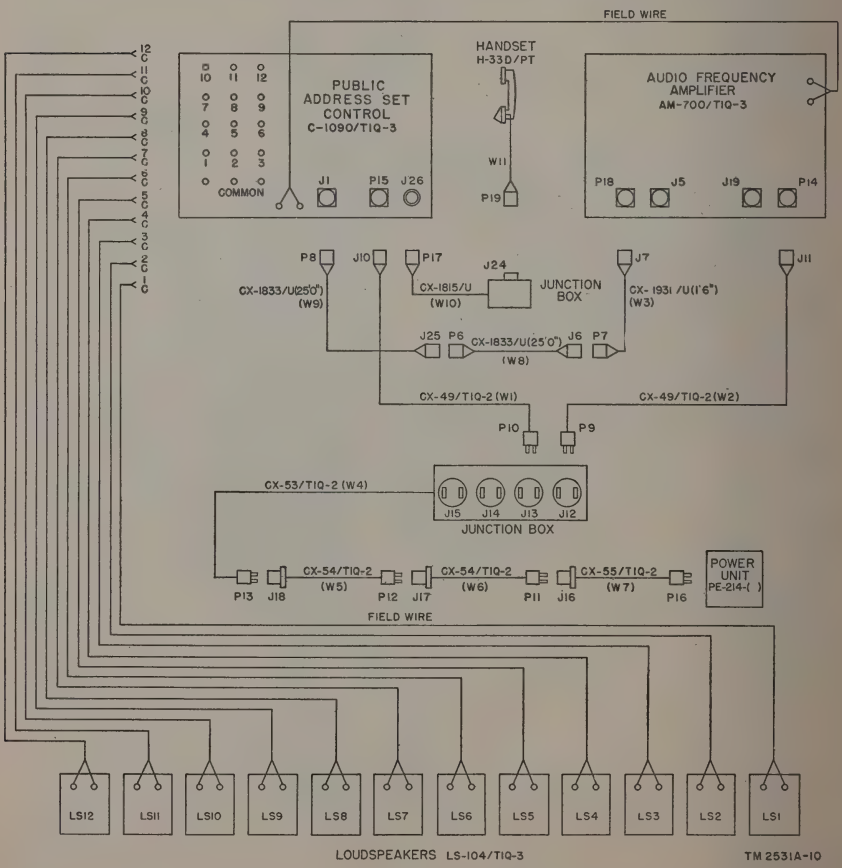


Figure 10. Public Address Set AN/TIQ–3A, cording diagram.

back and forth three times before leaving the horn, thereby providing the same efficiency as a nonreflex speaker several times larger. By means of four clasp fasteners, the bell of the horn is attached to the housing that holds the horn, the speaker-driver unit, the impedance-matching transformer, and a five-binding-post terminal strip. The horn design permits the nesting of the four horns for storing in Chest CY-96A/TIQ-3.

(2) The mounting bracket is equipped with an adjustable ratchet to permit elevation adjustment of the speaker. A wing bolt on the ratchet locks the speaker at the desired elevation. The mounting bracket is equipped with a bushing to fit the mounting stud. A wing bolt on the bushing locks the bushing on the mounting stud.

o. Power Unit PE-214-( ). This power unit is a compact, lightweight, electric-generating set, consisting of a gasoline-engine-driven alternator. The unit, which delivers 300 watts at either 120 or 240 volts a-c, is described fully in TM 11-945, which is packed with the equipment. A canvas cover is provided to protect the power unit when not in use.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

8. Unpacking Equipment
(fig. 11)

a. Unpacking New Equipment. Select a site for operations and place wooden boxes, right side up, at or near the selected site, and proceed as follows:

(1) Use a wire cutter, side-cutting pliers, or equivalent, and snap the metal bands that surround the wooden boxes.
(2) Use an approved nail puller and remove nails from the boards that make up the box covers; remove the boards.
(3) Remove the moisture-vaporproof barrier and open the cardboard cartons as shown in figure 11.
(4) Preserve all packing materials and stow away in the wooden boxes for future use.
(5) Check the equipment for damage. Also check the equipment against the packing list to determine if all components and spare parts are accounted for.
(6) Execute the appropriate forms (par. 2) if necessary.

b. Unpacking Used or Reconditioned Equipment. Used or reconditioned equipment is unpacked in the same manner as new equipment. Follow the procedure as outlined above.

9. Installation of Equipment

a. Remove the front cover from Case CY–38/TIQ–2 marked AMPLIFIER by loosening the four catch fasteners securing this cover (fig. 3), and set up the case in the location selected.

b. Remove the front cover from Case CY–38/TIQ–2 marked CONTROL UNIT by loosening the four catch fasteners securing this cover (fig. 2), and set up the case in the location selected.

c. Open the covers of the three cases marked Chest CY–96A/TIQ–3 and remove the loudspeakers from each case (fig. 6). The accessories case is stored in one of the three loudspeaker cases, as shown in figure 6.

Caution: The powerful magnets of the speaker-driver units will magnetize the steel parts of unprotected watches, compasses, and

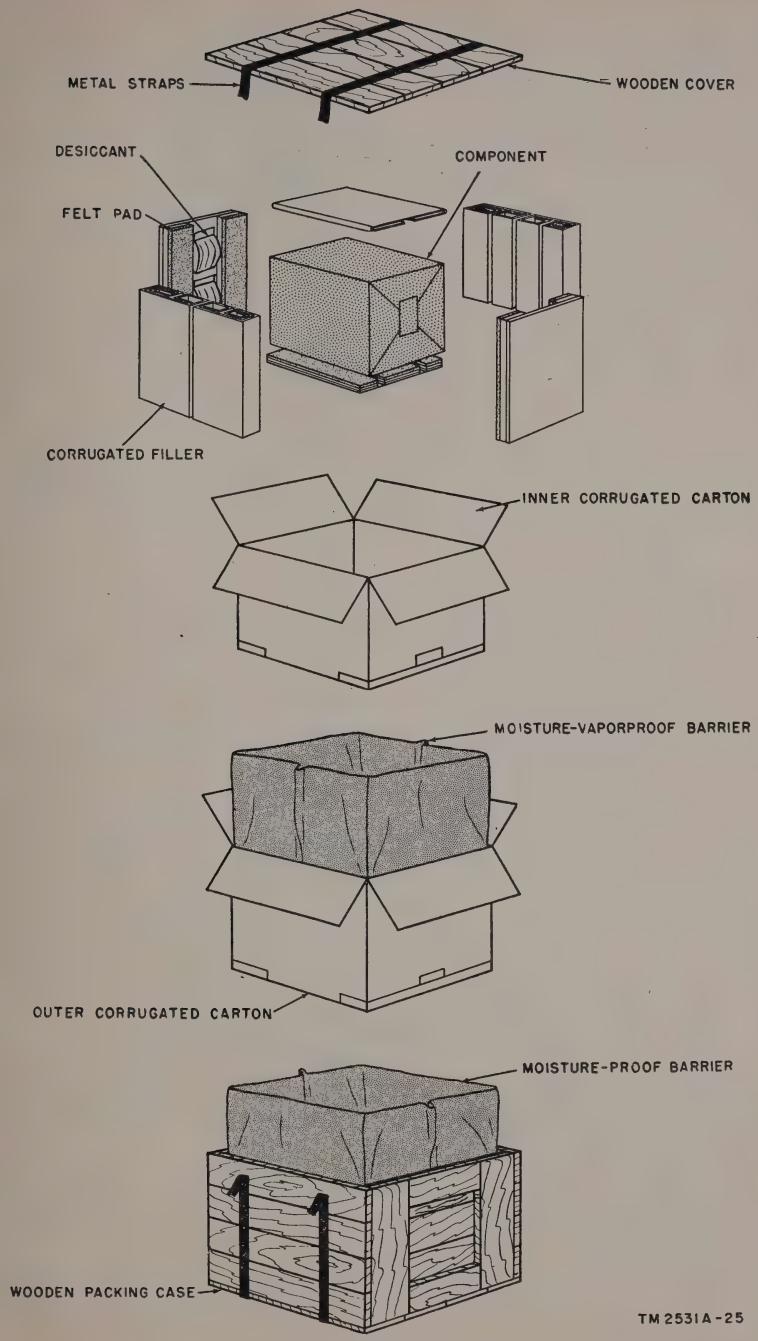


Figure 11. Cutaway view of representative export package.

instruments, making them useless. Remove such items from the vicinity of speaker-driver units.

d. Remove all cable assemblies, cords, and Handset H–33D/PT from the accessories case.

e. Remove the canvas cover from Power Unit PE–214–( ) and prepare the unit for operation as described in TM 11–945, which accompanies the power unit.

f. Remove Loudspeaker Stands MT–128A/TIQ–2 from their packing containers.

g. Assemble the loudspeakers as follows:

(1) Insert the rim of the small end of the speaker horn into the throat of the speaker-driver unit.

(2) Rotate the speaker horn until the slots in the speaker horn rim are opposite the four catch fasteners.

(3) Insert all four catches before pressing down the fasteners.

(4) Loosen the wing bolt securing the ratchet on the frame of the speaker and place the bushing at a right angle to the speaker body.

(5) Tighten the wing bolt.

h. Adjust the legs of the loudspeaker stand as follows:

(1) Loosen the wing bolt on the tripod base and adjust the legs to the desired position.

(2) Tighten the wing bolt.

(3) Loosen the wing bolt on the center post and adjust the stand to the desired height.

(4) Tighten the wing bolt.

i. Place the loudspeaker on the loudspeaker stand so that the bushing slides onto the mounting stud as far as it will go. Turn the speaker in the direction desired and tighten the wing bolt securely on the bushing. Loosen the wing bolt on the speaker frame, elevate the speaker to the desired level, and tighten the wing bolt.

10. Connections and Interconnections

(fig. 10)

a. Attach one wire of a speaker cable pair (field wire WD–1/TT) to the binding post marked 0, and the other wire to the binding post marked 500 on the speaker terminal board.

b. Attach one wire of the other end of the speaker cable to one of the binding posts numbered 1 to 12 on the terminal board on the front panel of control unit (fig. 2).

c. Attach the other wire of the speaker cable to one of the binding posts marked COMMON on the terminal board. Not more than four wires should be attached to any one of the COMMON binding posts.

d. Repeat the procedure described in *a*, *b*, and *c* above for as many of the 12 loudspeakers as are to be used.

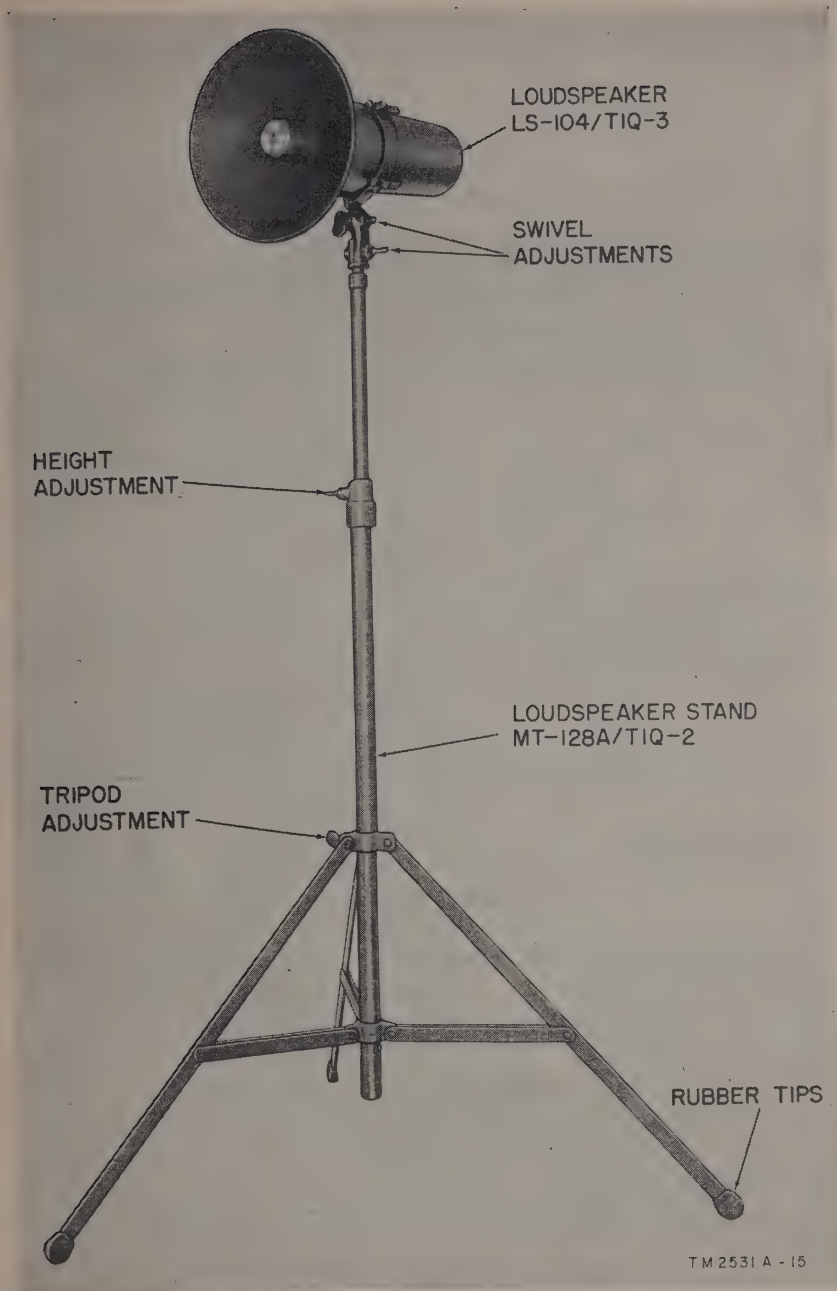


Figure 12. Loudspeaker LS–104/TIQ–3 on Loudspeaker Stand MT–128A/TIQ–2.

Note. The locations of all loudspeakers should be marked on the terminal board to facilitate use of the intercommunicating system.

e. Connect binding post H122 on the amplifier to binding post H119 on the control unit with field wire.

f. Connect binding post H121 on the amplifier to binding post H120 on the control unit with field wire.

g. Insert connector P19 (on cord W11 of Handset H–33D/PT) into connector J26 on the front panel of the control unit.

h. If an extension of the handset cord is required, insert plug P17 (on cord W10) into connector J26 on the control unit panel. Insert connector P19 (on the handset cord) into connector J24 (part of junction box on the other end of cord W10).

i. Insert connector P7 on cord W3 into output connector J1 on the control unit panel and insert connector J7 (on the other end of W3) into connector P18 on the amplifier unit panel.

j. If an extension of interconnecting cord W3 is required, insert connector J7 into P18 on the amplifier panel and connect connector P7 (on the other end of W3) to connector J6 of cord W8. Connect connector P6 (on the other end of W8) to connector J1 on the control unit panel. Cord W9 also may be used in the same manner for an additional extension of cords W3 and W8 (fig. 10).

k. Insert connector J10 on cord W1 into receptacle P15 on the control unit. Insert plug P10 (on the other end of power cord W1) into receptacle J12, J13, J14, or J15 in the junction box on power cord W4. Insert plug P13 (on power cord W4) into the output connector on Power Unit PE–214–( ).

l. Insert connector J11 (on amplifier power cord W2) into receptacle P14 on the amplifier panel and insert plug P9 (on the other end of W2) into receptacle J12, J13, J14, or J15 in the junction box (on power cord W4).

m. If an extension for power cord W4 is required, insert plug P13 (on power cord W4) into connector J18 (on power extension cord W5) and insert P12 (on the other end of power extension cord W5) into the output connector on Power Unit PE–214–( ).

n. If further extension of power cord W4 is desired, insert plug P12 (on cord W5) into connector J17 (on power extension cord W6) and insert plug P11 (on the other end of power extension cord W6) into the output connector on Power Unit PE–214–( ).

o. To obtain power from a standard a-c outlet, insert connector J16 (on adapter cord W7), into plug P13 on power cord W4 (or plug P12 on W5, or plug P11 on W6), and insert plug P16 (on the other end of adapter cord W7) into the standard a-c outlet.

Section II. CONTROLS AND THEIR USES

Note. This section describes, locates, illustrates, and furnishes the operator sufficient information pertaining to the various controls for the proper operation for this equipment.

11. Public Address Set Control C–1090/TIQ–3

(fig. 2)

a. On-Off (S19). This power switch is an SPST (single-pole, single-

throw) toggle switch which connects or disconnects the a-c power to the control unit.

b. 115–230 (S4). This is a DPDT (double-pole, double-throw) toggle switch. With the switch in the 115-volt position, the two primary windings of power transformer T7 are in parallel. With the switch in the 230-volt position, the two primary windings are connected in series.

c. Switches S5 Through S16. These switches are SPDT (single-pole, double-throw) toggle switches which enable selection of any one or all of the speakers.

d. All (S17). This is an SPDT toggle switch which connects all the speakers to the control unit at the same time regardless of positions of switches S5 through S16.

e. Speaker On-Off (S18). This is an SPDT toggle switch which connects the monitor speaker LS13 into the circuit.

f. Constant (S2). This switch is a DPDT toggle switch. In the CONSTANT position, it feeds the CONSTANT tone generator with B current and thus sets the generator into operation.

g. Intermit—Warble (S20). This switch is a triple-pole, double-throw toggle switch. In the INTERMIT position, a series of short tone dashes are produced. In the WARBLE position, a rising and falling tone is produced.

h. Talk Volume (R50). This control is a 50-ohm, wire-wound potentiometer which controls the microphone (handset) output to transformer T2. Turning the control in a clockwise direction increases the input voltage fed to control grid V3.

i. Listen Volume (R51). This 50-ohm, wire-wound potentiomter controls the output of the monitor speaker LS13. Turning the control in a clockwise direction increases the volume.

j. Press to Talk—Line (S21). This switch is an SPDT toggle switch which, in either position, causes the monitor speaker to function as a microphone in order to acknowledge a call from a remote speaker. In the LINE position, the toggle locks in place. When released in the PRESS-TO-TALK position, the toggle returns to the center position (OFF) automatically.

Note. If the TALK VOLUME control (R50) is turned clockwise too far, a howling, whistling sound may be heard. This is acoustical feedback, and it may be reduced or eliminated by placing the speakers in front of the microphone and facing away from it. If feedback still occurs, turn TALK VOLUME control (R50) counterclockwise to a point just under where feedback occurs.

12. Audio Frequency Amplifier AM–700/TIQ–3

(fig. 3)

a. On-Off (S1). This power switch is a DPST toggle switch which connects or disconnects the a-c power to the amplifier.

b. 115–230 (S3). This switch is a DPDT toggle switch. When

the switch is in the 115-volt position, the two primary windings of the power transformer are in parallel. For 230-volt operation, the two primary windings are in series.

c. Volume (R47). This control is a 100,000-ohm, composition potentiometer which controls the input voltage to the control grid of tube V1 and, consequently, the volume from the loudspeakers.

Section III. OPERATION UNDER USUAL CONDITIONS

13. Operation as a Public Address Set

a. After checking the a-c line voltage, place 115–230 switch (S3) on the amplifier, and 115–230 switch (S4) on the control unit in either the 115- or 230-volt position. Lock both switches in the desired positions with the switch bracket (A3) on the amplifier and the switch bracket (A4) on the control unit.

b. Turn VOLUME control (R47) on the amplifier in a clockwise direction to position 5.

c. Turn TALK VOLUME control (R50) on the control unit in a clockwise direction to position 5.

d. Turn ON-OFF switch (S19) on the control unit to the ON position, and turn ON-OFF switch (S1) on the amplifier unit to the ON position.

e. To broadcast over one or more of the 12 loudspeakers, place the switch or switches controlling the desired speakers in the ON position (switches S5 through S16 on the control unit panel).

f. Depress the switch on Handset H–33D/PT and speak directly into the microphone of the handset.

g. Adjust the VOLUME control (R47) on the amplifier and the TALK VOLUME control (R50) on the control unit until the desired volume is obtained at the speaker locations. Release the handset switch when talking is completed.

h. To broadcast over all 12 loudspeakers, place the ALL switch (S17) on the control unit in the ALL position and proceed as described in *f* above. Sound will emanate from all the loudspeakers regardless of the position of the individual speaker selector switches (S5 through S16).

Note. If the TALK VOLUME control (R50) is turned too far clockwise, a howling, whistling sound, known as feedback, may occur. Eliminate feedback by placing the speakers in front of the microphone and facing away from it. If feedback still occurs, turn TALK VOLUME control (R50) counterclockwise to a point just before feedback occurs.

14. Operation as Intercommunication System

a. With equipment set up as described in paragraph 13, start communication with the desired loudspeaker locations by transmitting a predetermined signal to alert the listener as follows:

(1) To turn on the constant-tone signal, place CONSTANT SWITCH (S2) in CONSTANT position. A steady tone should emanate from the desired loudspeaker.
(2) To broadcast an intermittent-tone signal, place the INTERMIT-WARBLE switch (S20) in the INTERMIT position. A series of short tone dashes sould be produced.
(3) To send a warble-tone signal, place the INTERMIT-WARBLE switch (S20) in the WARBLE position. A rising and falling tone should be produced.
(4) Communicate with the remote location as described in paragraph 13*f* and *g*.

b. To receive a signal from the remote speaker location, release the handset switch. Adjust the LISTEN VOLUME control (R51) on the control unit for the desired signal level.

c. To receive a signal from the remote speaker location through the monitor speaker LS13, place the SPEAKER switch (S18) in the ON position. Adjust the LISTEN VOLUME control (R51) for desired signal level.

d. To use the monitor speaker to talk to the remote speaker location (with SPEAKER switch (S18) in the ON position), depress the PRESS-TO-TALK switch (S21) and speak into the monitor speaker. Adjust the TALK VOLUME control (R50) for the desired sound level.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

15. Unusual Conditions

Public Address Set AN/TIQ–3A may be operated under unusual conditions of severe dust, moisture, and temperature without injury to the equipment. However, if operation under unusual conditions is to be maintained for long periods, certain precautions must be taken. Refer to paragraphs 16, 17, and 18 for information covering operation under specific unusual conditions.

16. Operation in Arctic Climates

Condensation will form inside the public address set when it is exposed alternately to low and high temperatures. Maintain as constant a temperature as is possible in the storage of the equipment. Refer to TB SIG 66 for additional winter operational information.

17. Operation in Desert Climates

Preventing the entry of dust and sand is a major problem in desert areas. Under severe conditions it may be necessary to improvise covers to protect the equipment from dust and sand. Consult TB SIG 75 for additional desert operational information.

18. Operation in Tropical Climates

The public address set has been moistureproofed and fungiproofed adequately. Excessive moisture between high voltage and ground may result in the formation of leakage paths and voltage discharges. Damage to the varnish film must be repaired immediately upon discovery. Cover the equipment whenever feasible to avoid drenching during tropical downpours. Cover it tightly after use to conserve internal heat and to reduce the possibility of moisture condensation during the cooler nights.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

19. Definition of Preventive Maintenance

Preventive maintenance is scheduled work performed on equipment during shut-down periods to keep it in such good working order that breakdowns and needless interruptions in service will be kept to a minimum.

20. Use of Preventive Maintenance Forms

a. The information in paragraph 21 is presented as a guide to personnel making an inspection of equipment in accordance with instructions on DA AGO Forms 11–250 and 11–251. The decision as to which items on the forms are applicable to this equipment is a tactical decision to be made in the case of first echelon maintenance by the communication officer/chief or his designated representative, and in the case of second and third echelon maintenance, by the individual making the inspection. Instructions for the use of each form appear on the reverse side of the form.

b. The first two columns in the table in paragraph 21 serve as a cross reference between the item numbers of DA AGO Forms 11–250 and 11–251 and the preventive maintenance information in this manual.

21. Performing Preventive Maintenance

Perform the preventive maintenance operations at the intervals indicated, unless (because of circumstances) these intervals are reduced by the local commander.

Caution: Tighten screws, bolts, and nuts carefully. Fittings tightened beyond the pressure for which they are designed may be damaged or broken.

DA AGO Form 11-250 item No.	DA AGO Form 11-251 item No.	Preventive maintenance operations
		DAILY
1	1	Check for completeness and satisfactory condition of the equipment. The components of the equipment are listed in paragraph 6 and are illustrated in figure 1.
2	2	Remove all dirt, grease, grime, corrosion, and oil from the exterior of components.
3	3	Remove corrosion, tarnish, dirt, dust, grease, and oil from connectors.
		WEEKLY
		Caution: Disconnect all power before performing the following operations. Upon completion, reconnect power and check for satisfactory operation.
4	4	Inspect exterior of components for rust, corrosion, loose or missing screws, chipped paint, and cracks.
5	5	Inspect cords and cables for loose terminals; frayed, cut, or gouged insulation or jacketing; and broken conductors.
6	6	Tighten loose exterior screws, bolts, fastenings, and mountings.
7	7	Inspect electrical connections for firmness of seating, proper contact, tightness, corrosion, grease, oil, and dirt.
8	8	Inspect connectors for chips, cracks, corrosion, tarnish, roughness, and bends.
		MONTHLY
----------	11	Inspect tube sockets for cracks, poor contacts, and loose solder connections.
----------	12	Check tubes for proper seating and loose envelopes.
----------	13	Solder any broken or loosely soldered connections (figs. 20 and 21).
----------	14	Inspect internal wiring and cabling for loose terminals, shorts due to cut or gouged insulation, and broken conductors.
----------	18	Inspect capacitors, potentiometers, and resistors for loose terminals, corrosion, leaks, bulges, blistering, and discoloration.
----------	20	Inspect all labels, engravings, and plates for legibility.
----------	21	Clean, tighten, and where applicable, lubricate the air filter (fig. 3).
----------	23	Inspect moistureproofing and fungiproofing.
----------	24	Inspect for proper seasonal maintenance where applicable.
----------	25	Inspect controls for binding, scraping, and positive action.

Section II. LUBRICATION AND PRESERVATION

22. General Lubrication

Once monthly, perform the following:

a. Apply 2 drops of oil, engine, heavy duty (OE–10) to the pivots on the clasps of the cases and chests.

b. Apply 2 drops of oil (OE–10) to each oilhole on blower motor B1.

23. Weatherproofing

a. General. Public Address Set AN/TIQ–3A, when operated under severe climatic conditions, such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt, excessive moisture, and extreme temperatures are harmful to most materials used in the construction of this equipment.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised, which, if properly applied, provides a reasonable degree of protection. This treatment is explained fully in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure in extremely low temperatures are explained fully in TB SIG 66 and TB SIG 219.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained fully in TB SIG 75.

CHAPTER 4
FIELD MAINTENANCE INSTRUCTIONS

Section I. GENERAL

24. Field Maintenance Service

a. Purpose. The repair instructions that follow are intended for use by field maintenance personnel trained and equipped to handle complex repairs which require special equipment not generally available to general maintenance personnel.

b. Scope. The scope of repairs that may be performed by units having field maintenance responsibility is limited only by the tools and test equipment available and by the skill of assigned personnel.

25. General Theory of Control Circuits

a. This public address set is arranged to communicate from the control location to a loudspeaker (or loudspeakers) and to receive

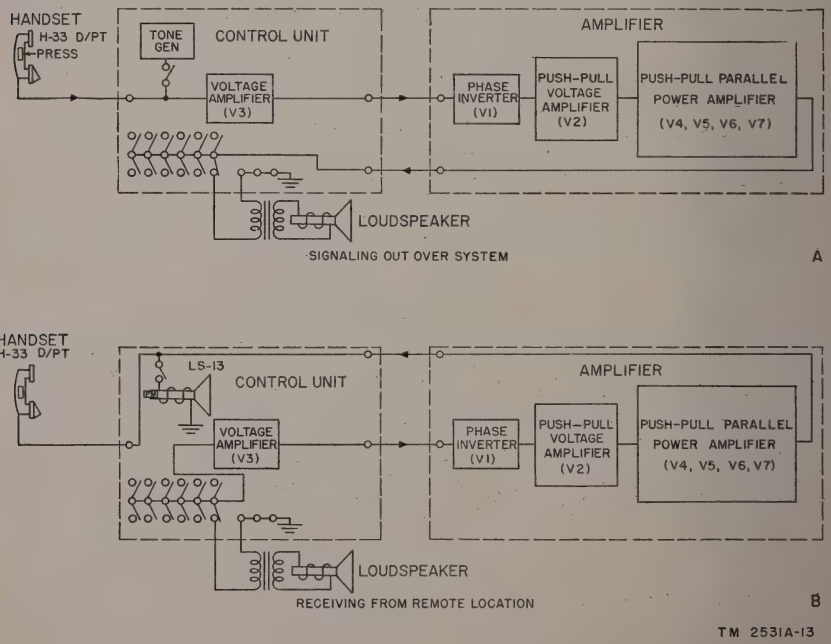


Figure 13. Public Address Set AN/TIQ–3A, block diagram.

a response from the loudspeaker location. These operations are illustrated in the block diagram (fig. 13).

b. With the PRESS-TO-TALK handset switch closed, relay K1 (fig. 14) is energized and closes the circuit between the amplifier (entering the remote control unit through binding posts H119 and H120) and the speaker switch panel. The speakers, to which the signal is transmitted, are controlled by a series of switches S5 through S16. The voice or tone originates at the control unit and passes through amplifier V3 and output jack J1 to the input of the amplifier unit. From the amplifier output binding posts H121 and H122, the signal returns to the control unit and on to the loudspeakers.

c. When relay K1 is not energized and ALL switch S17 is off or connected to resistor R46, an audio signal from any of the 12 speakers enters the control unit through the speaker selector switches S5 through S16. This signal passes through the contacts of relay K1 to the input of the control unit voltage amplifier. The talk-back signal now can be heard in the receiver of the handset or in monitor speaker LS13 when switch S18 is placed in the ON position.

Section II. THEORY OF OPERATION

26. Voltage-Amplifier Stage Using Tube V3

(figs. 14 and 23)

When the PRESS-TO-TALK switch on Handset H–33D/PT is operated, relay K1 is energized. When the diaphragm of the microphone is actuated by sound waves, a varying voltage appears across its terminals. This voltage is conducted through jack J26, to capacitor C8. Capacitor C8 blocks dc (direct current) from entering the receiver of the handset and couples the audio voltage to the contacts of relay K1 and to potentiometer R50. When the monitor loudspeaker is used as a microphone, relay K1 is energized by switch S21 (PRESS-TO-TALK). Vibration of the speaker diaphragm causes the voice coil to move through the magnetic field of the permanent magnet of the loudspeaker, which induces a voltage in the voice coil that varies at audio frequencies. This voltage is fed through switch S18 and the contacts of relay K1 to potentiometer R50 (TALK VOLUME). Potentiometer R50 controls the amount of voltage applied to the primary of transformer T2. Transformer T2 steps up the audio voltage and presents the proper input impedance to tube V3. Resistor R16 is used to broaden the response of transformer T2. Resistor R7 sets the operating grid bias of tube V3. The elements of tube V3 are wired to connect the two triode sections of the tube in parallel. Resistor R17 is the plate load resistor for both triodes of tube V3. This tube amplifies the input audio voltage received from transformer T2. Capacitor C26 prevents the tube from oscillating at high audio frequencies. Capacitor C16 provides a low-impedance path to ground

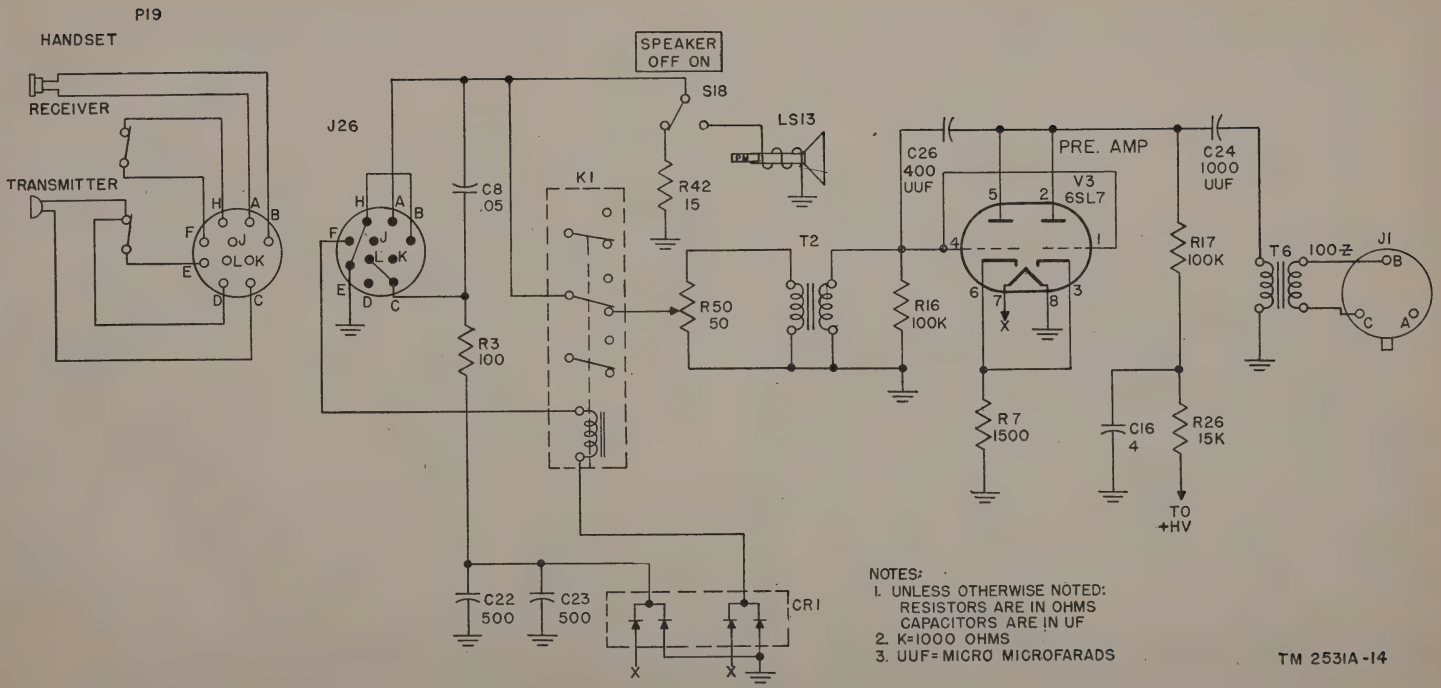


Figure 14. Microphone input, simplified schematic.

for any audio voltage present at the junction of resistors R17 and R26. This prevents audio voltages from being fed back to the power supply. Resistor R26 is a decoupling resistor for tube V3. Capacitor C24 couples the audio-output voltage from plates No. 1 and No. 2 of tube V3 to the primary of line-coupling transformer T6. The induced voltage in the secondary of transformer T6 then is fed to the input of Audio Frequency Amplifier AM–700/TIQ–3 through Electrical Special Purpose Cable Assembly CX–1931/U (W3) and Electrical Special Purpose Cable Assembly CX–1833/U (W8 and W9).

27. Tone-Generator Channel

The voltage regulator tube VR105 (V11) maintains a constant voltage from the power supply by varying the voltage drop across resistor R41, which provides a fixed voltage for the operation of tone generator tubes E1 and E2.

a. Constant-Tone Generator. When CONSTANT switch S2 is in the ON position, power is connected to tubes E1 and E2, but only the

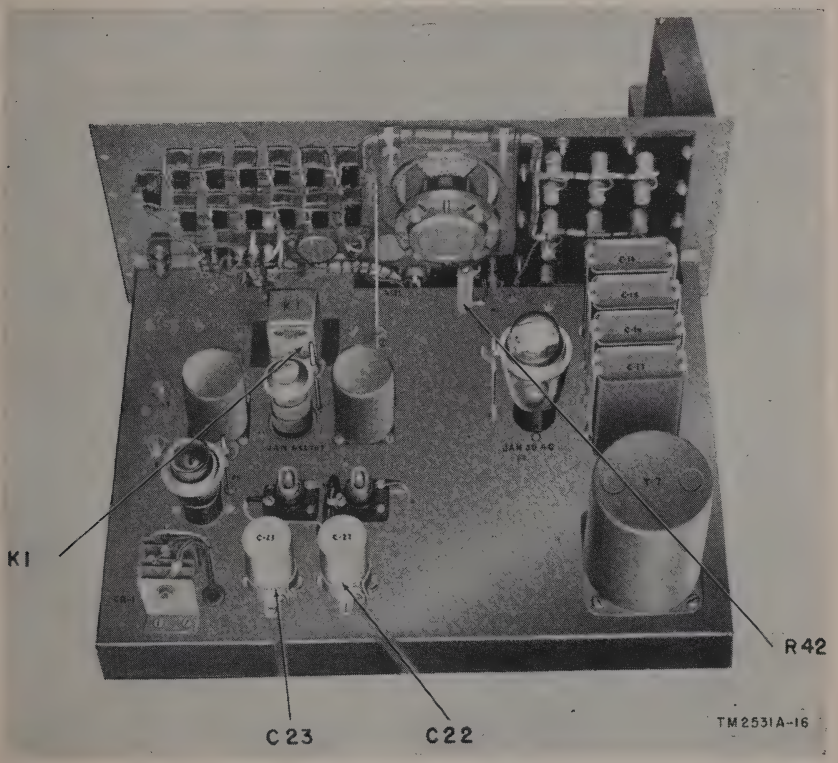


Figure 15. Public Address Set Control C–1090/TIQ–3, top view of chassis (Order No. 6256–Phila–51). (Unlabeled parts shown above bear the same reference symbols and are located in the same places as similar parts on the chassis shown in figure 18.)

output of E2 is used. Variable resistor R49 provides a means of adjusting the operating voltage for constant-tone generator E2. The adjustment of this resistor, once set, need not be changed. Resistor R25 limits the minimum voltage supplied to E2. Tube E2, acting as a relaxation oscillator, generates an audio voltage, the frequency of which is determined largely by capacitor C18, resistor R39, and the transformer secondary. When tube E2 is used as a constant-tone generator, resistor R40 and capacitor C9 are not in the circuit.

b. Intermittent-Warble Generators. When the INTERMIT-WARBLE switch S20 is in the INTERMIT position, the audio-output voltage of tube E1 is coupled to tube E2 through a network consisting of resistor R37, capacitor C9, and resistor R40. Variable resistor R48 provides a means of adjusting the operating voltage for tube E1. The adjustment of this resistor, once set, need not be changed. Resistor R24 limits the minimum voltage supplied to E1. Capacitor C25, in conjunction with resistors R36 and R38, determines the frequency of the intermittent or warble signals. Resistor R36 limits the discharge of current from capacitor C25. When capacitor C25 has charged up to a point sufficiently high to ionize tube E1, the capacitor will discharge through resistor R36 and tube E1. While tube E1 is

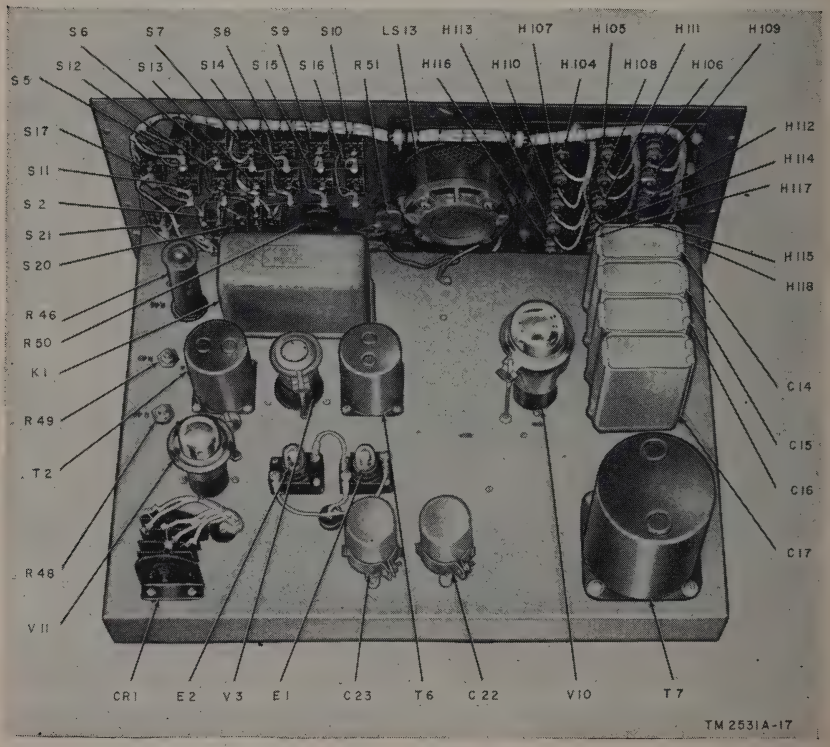


Figure 16. Public Address Set Control C–1090/TIQ–3, top view of chassis (Order No. 6257–Phila–51).

ionized, its internal resistance is low; this shorts the ouptut terminal of tube E2 to ground and causes no output for a very short time; thus an intermittent signal is produced. When switch S20 is in the WARBLE position, the components in the circuit function the same as for intermittent operation, except that a larger resistor R31 is placed in the coupling lead between tubes E1 and E2, which limits the effect of tube E1 upon tube E2 and causes the signal from tube E2 to decrease when tube E1 is ionized; this produces a rising and falling signal. The signal is coupled to the control grid of V3 by capacitor C18. The operation of V3 is the same as described in paragraph 26.

28. Voltage-Amplifier Stage Using Tube V1
(fig. 23)

The audio-output voltage from tube V3 in the control unit is received through connector P18 on the amplifier panel and is conducted to the primary of transformer T1. Transformer T1 properly matches the low impedance of the interconnecting cable to the higher impedance of the grid circuit of tube V1. VOLUME control R47 varies the input voltage to the control grid. Resistor R35 reduces the shunting effect of R47 and decouples the line-input circuit from the booster-input circuit. The voltage drop developed across resistor R5 is used

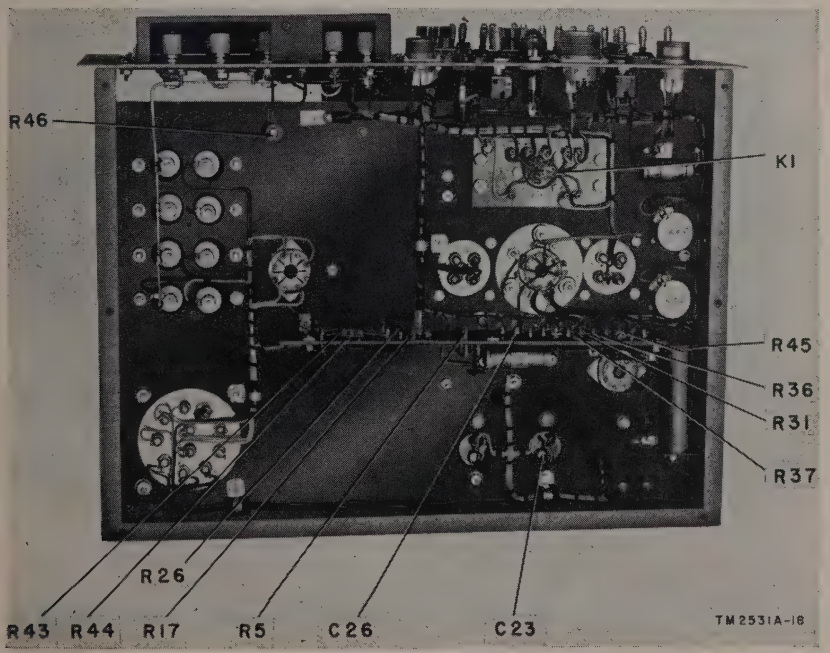


Figure 17. Public address Set Control C–1090/TIQ–3, bottom view of chassis (Order No. 6256–Phila–51). (Unlabeled parts shown above bear the same reference symbols and are located in the same places as similar parts on the chassis shown in figure 18.)

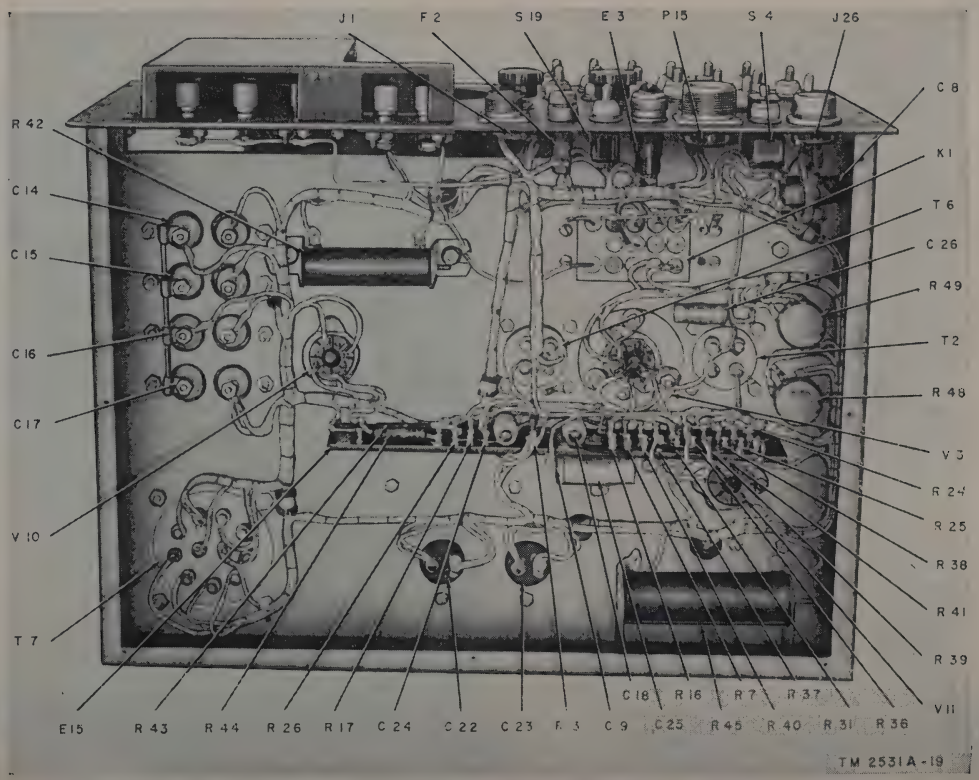


Figure 18. Public Address Set Control C–1090/TIQ–3, bottom view of chassis (Order No. 6257–Phila–51).

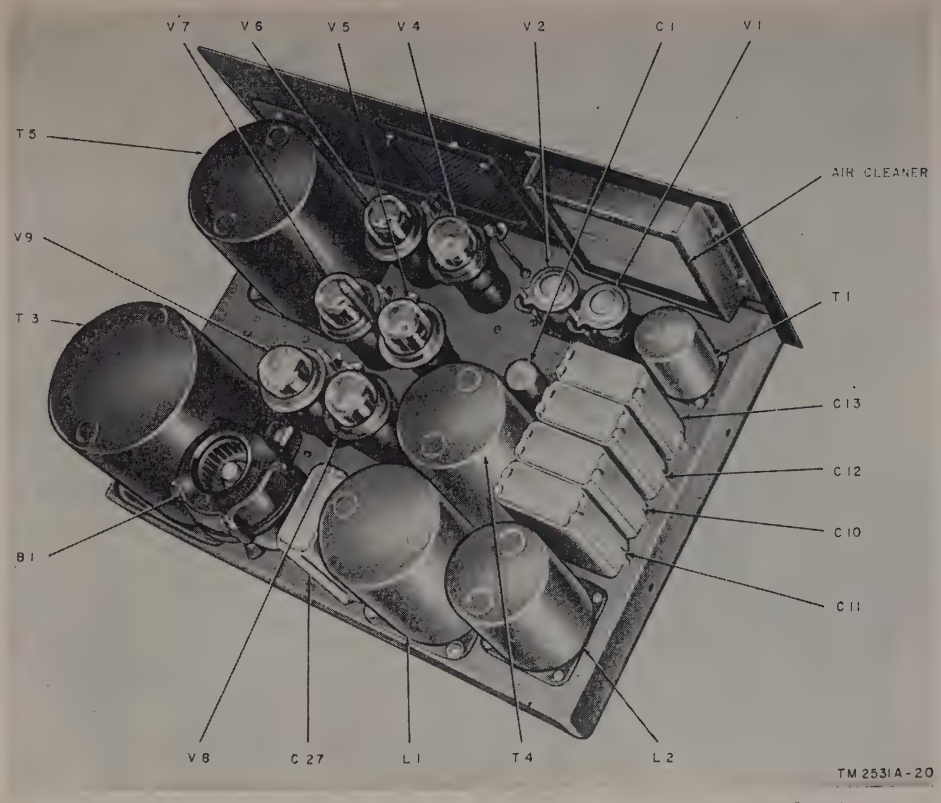


Figure 19. Audio Frequency Amplifier AM–700/TIQ–3, top view of chassis.

to bias the control grids of both sections of tube V1. Capacitor C1 bypasses audio currents around resistor R5. The first section of V1 amplifies the audio-input voltage received from transformer T1. Resistor R10 is the plate load resistor of the first section of tube V1. Capacitor C4 couples the audio-output voltage of plate No. 1 of tube V1 to control grid No. 1 of tube V2, and also to the phase-inversion circuit.

29. Voltage-Amplifier Stage Using Tube V1 with Booster Input

Resistor R1, in conjunction with resistor R4, provides a return circuit to ground for control grid No. 1 of tube V1. Audio voltage across resistor R1 is transferred to grid No. 1 through resistor R4. Resistor R4 limits the audio voltage fed to grid No. 1 and decouples the booster-input circuit from the line-input circuit through transformer T1. Resistor R1 also provides a fixed impedance of 100 ohms for the booster input. From this point on, the line-input channel and the booster-input channel are identical.

30. Phase-Inverter Stage

(fig. 23)

Section No. 2 of tube V1 is used in a phase-inverter circuit. The audio-input voltage to the control grid of the phase inverter is limited by resistor R8. Resistor R9 loads the plate of section No. 2. Capacitor C13, in combination with resistor R18, decouples the plates of both sections of tube V1 from the power supply. Capacitor C5 couples the audio-output voltage of the phase inverter to the control grid of section No. 2 of tube V2. Resistor R27 in combination with resistor R8 forms a voltage-divider network. The signal across R27 is injected into the control grid of the phase inverter. Resistor R5 provides cathode bias voltage for both sections of tube V1.

31. Push-Pull Voltage-Amplifier Stage

(fig. 23)

Resistors R8 and R27, in combination with resistor R6, provide the operating bias for control grid No. 1 of tube V2. Resistor R15, in combination with resistor R6, provides the operating bias for control grid No. 2 of tube V2. Section No. 1 of tube V2 amplifies the audio-output voltage of section No. 1 of tube V1. Section No. 2 of tube V2 amplifies the audio-output voltage of the phase-inverter section of tube V1. Resistor R12 loads plate No. 1 of tube V2. Resistor R11 loads plate No. 2 of tube V2. Resistor R19 decouples both plate circuits of tube V2 from the power supply. Capacitor C6 couples the audio-output voltage of plate No. 1 of tube V2 to the control grids

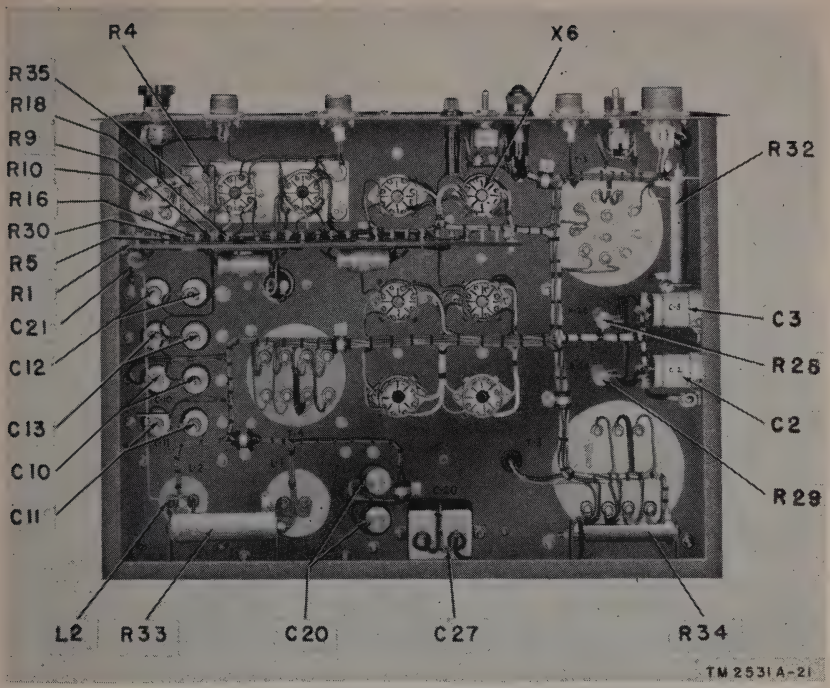


Figure 20. Audio Frequency Amplifier AM–700/TIQ–3, bottom view of chassis (Order No. 6256–Phila–51). (Unlabeled parts shown above bear the same reference symbols and are located in the same places as similar parts shown in figure 21.)

of tubes V4 and V6. Capacitor C7 couples the audio-output voltage of plate No. 2 of tube V2 to the control grids of tubes V5 and V7.

32. Push-Pull Parallel Power-Amplifier Stages (fig. 23).

Grid resistor R14, in combination with cathode resistor R28, provides the operating bias for the control grid of tube V4. Resistor R20, in combination with resistor R21, decouples the control grid of tube V4 from the control grid of tube V6. Grid resistor R14, in combination with cathode resistor R29, provides the operating bias for the control grid of tube V6. Grid resistor R13, in combination with cathode resistor R28, provides the operating bias for the control grid of tube V5. Resistor R22, in combination with resistor R23, decouples the grid of tube V5 from the grid of tube V7. Resistor R13, in combination with cathode resistor R29, provides the operating bias for the control grid of tube V7. Capacitor C2 bypasses audio currents around bias resistor R28. Capacitor C3 bypasses audio currents around bias resistor R29. Tubes V4 and V6, in parallel, amplify the audio-output voltage of section No. 1 of tube V2. Tubes V5 and V7, in parallel, amplify the audio-output voltage of section

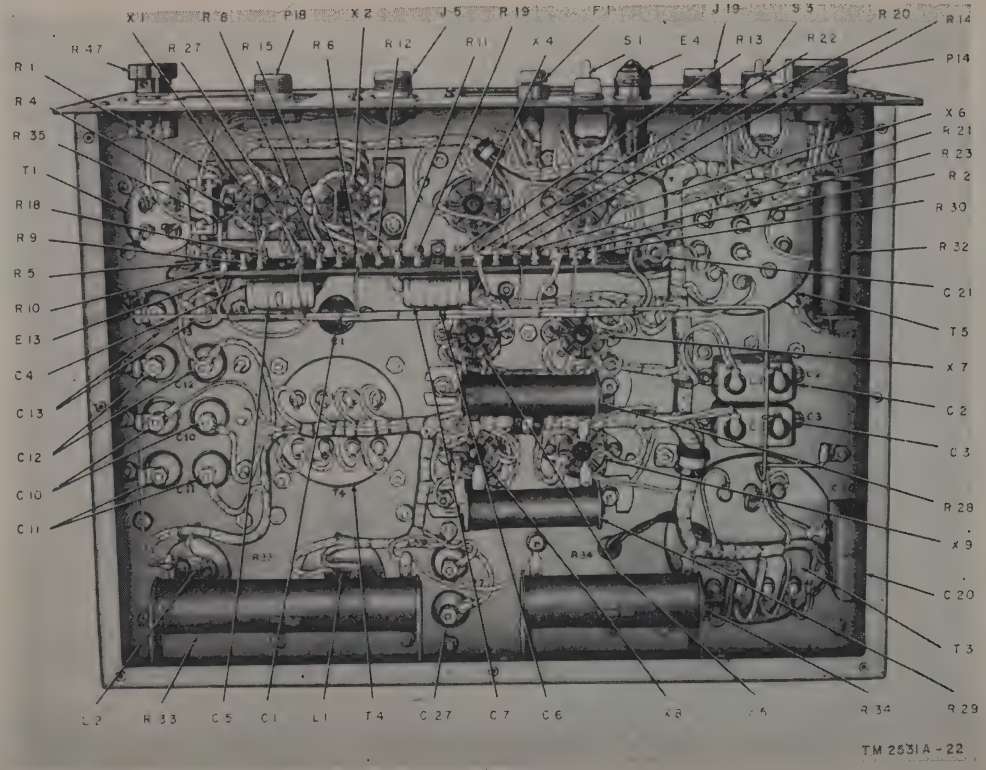


Figure 21. Audio Frequency Amplifier AM–700/TIQ–3, bottom view of chassis (Order No. 6257–Phila–51).

No. 2 of tube V2. Resistors R33 and R34 form a voltage divider to supply a fixed voltage to the screen grids of tubes V4, V5, V6, and V7. Capacitor C20 bypasses audio currents from the screen grids of tubes V4, V5, V6, and V7 to ground. The full voltage output of the power supply is supplied to the plates of tubes V4, V5, V6, and V7 through the center-tapped primary winding of output transformer T5. Transformer T5 couples the audio-output voltage from the plates of the four tubes to amplifier output terminals H121 and H122. Resistor R30 drops the inverse-feedback voltage from the 4-ohm secondary tap on output transformer T5 to the proper value. Capacitor C21 couples the inverse-feedback voltage to the plate of section No. 1 of tube V1 and blocks the plate voltage of tube V1 from the output transformer. When the amplifier is used as a booster amplifier (par. 37), resistors R2 and R32 are used as a voltage divider to provide the proper voltage to operate one or more power amplifiers. The output voltage from terminals H121 and H122 on the amplifier is coupled to terminals H119 and H120 on the control unit by means of field wire (Wire WD–1–TT). This wire is not supplied with the equipment. When relay K1 is energized by the microphone switch or the PRESS-TO-TALK switch on the control unit, the audio voltage is fed to the bank of switches (S5 through S16) on the control panel, and distributed to the loudspeakers from terminals H104 to H118, inclusive. The connections from the terminals on the control unit to the individual loudspeakers are made with field wire (Wire WD–1–TT).

33. Power Supply of Public Address Set Control C–1090/TIQ–3 (fig.22)

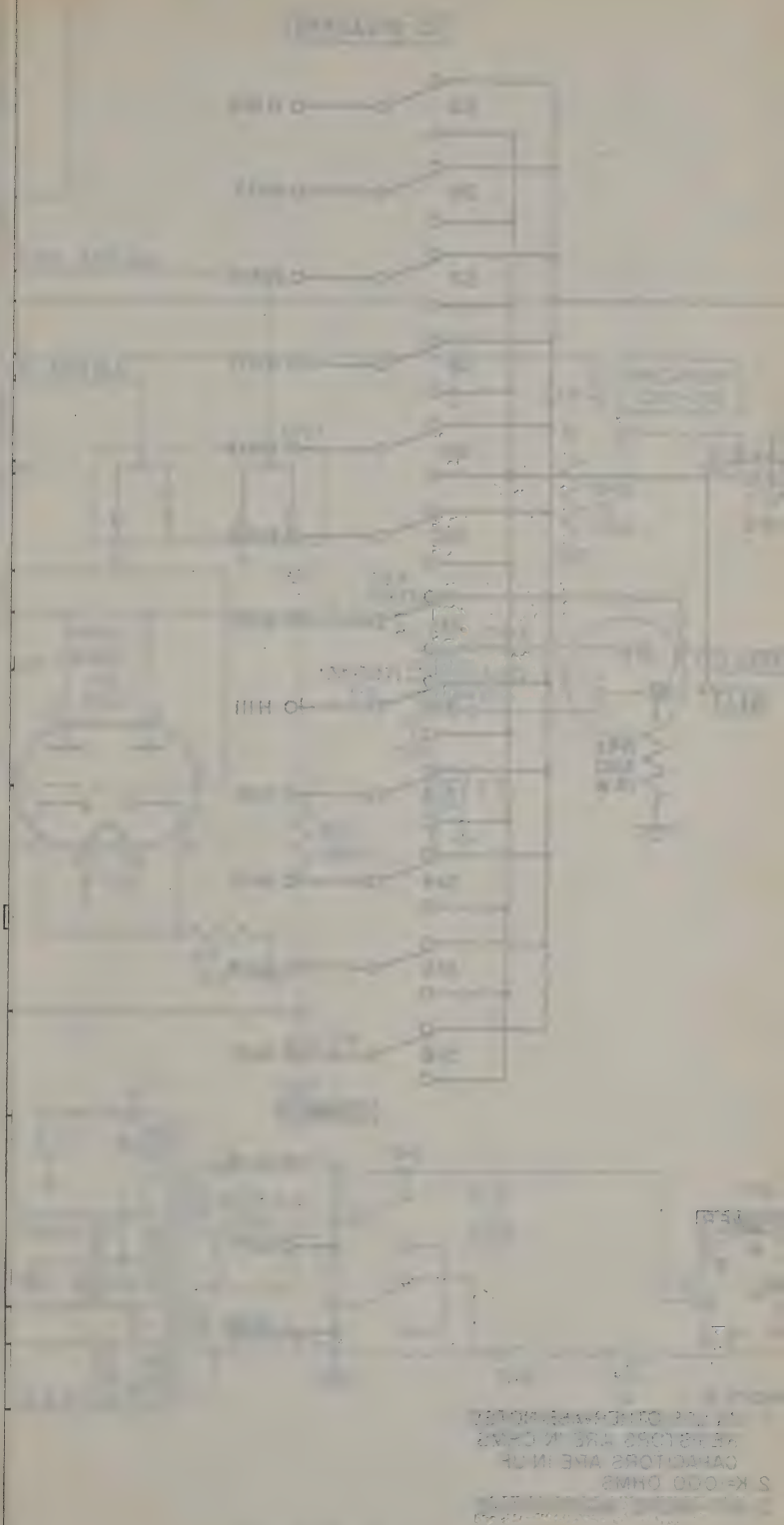
A-c voltage from Power Unit PE–214–( ), or from an external source, is conducted through Cord CX–49/TIQ–2 (W1), Cord CX–53/TIQ–2 (W4), Cords CX–54/TIQ–2 (W5 and W6), and Cord CX–55/TIQ–2 (W7) to connector P15 on the front panel of the control unit. From this receptacle, the a-c voltage passes through fuse F2, which protects the control unit against damage from an overload or short circuits, to switch S19 on the front panel of the control unit. When switch S19 is in the ON position and switch S4 is in the proper voltage position, a-c voltage is applied to the two primary windings of transformer T7. For 115-volt operation, the two primary windings are connected in parallel and for 230-volt operation, the two primary windings are connected in series. Transformer T7 also steps down the a-c line voltage to the proper value for the filaments of tubes V3 and V10, pilot light E3, and selenium rectifier CR1. Pilot light E3 indicates when power is applied to the control unit. The high-voltage secondary winding of transformer T7 is connected to the plates of full-wave rectifier tube V10. This tube rectifies the high-voltage a-c and delivers a pulsating d-c voltage

to filter capacitor C17. Capacitors C17, C15, and C14, in combination with resistors R43 and R44, form a filter for removing the ripple from the d-c output voltage. Rectifier CR1 is a metallic, two-section selenium rectifier. This device presents a high resistance to the flow of current through it in one direction and comparatively low resistance to the flow of current through it in the opposite direction. Therefore, if a-c is applied to the terminals of the rectifier, current flows only in one direction and produces a d-c voltage. The a-c for rectifier CR1 is supplied by the 6-volt step-down winding of transformer T7. One section of the voltage output of rectifier CR1 is connected to relay coil K1 when switch S21 is in either the up or the down position. The other section of the voltage output of CR1 is connected to connector J26 through resistor R3 for the operation of the microphone of Handset H–33D/PT. Resistor R3 reduces the d-c output voltage of rectifier CR1 to the proper value for the operation of the microphone. Capacitors C22 and C23 act as a ripple filter for the output voltage of rectifier CR1. That portion of rectifier CR1 connected from relay K1 to ground limits current surges due to the development of a cemf (counter electromotive force) and effectively prevents relay chatter.

34. Power Supply of Audio Frequency Amplifier AM–700/TIQ–3

(fig. 23)

The a-c voltage from Power Unit PE–214–( ), or an external source, is conducted through Cord CX–49/TIQ–2 (W2), Cord CX–53/TIQ–2 (W4), Cords CX–54/TIQ–2 (W5 and W6), and Cord CX–55/TIQ–2 (W7) to connector P14 on the front panel of the amplifier. From this receptacle, the a-c voltage passes through fuse F1, which protects the amplifier against damage from shorts and overloads, to switch S1 on the front panel of the amplifier. When switch S1 is in the ON position, and switch S3 is in its proper voltage-selection position, a-c voltage is applied to the primary windings of transformers T3 and T4. Each of these two transformers has two primary windings. For 115-volt operation, the two primary windings are connected in parallel. For 230-volt operation, the two primary windings are connected in series. Filament transformer T4 steps down the a-c line voltage to the proper value for the filaments of tubes V1, V2, V4, V5, V6, V7, V8, and V9, and pilot light E4. The pilot light indicates when the power is applied to the amplifier. The high-voltage transformer T3 steps up the a-c line voltage, which is delivered to the plates of full-wave rectifier tubes V8 and V9 in parallel. These tubes rectify the a-c voltage and deliver a pulsating d-c voltage through connector P14 to a filter network consisting of capacitors C10, C27, C11, and C12, and filter chokes L1 and L2. This filter network

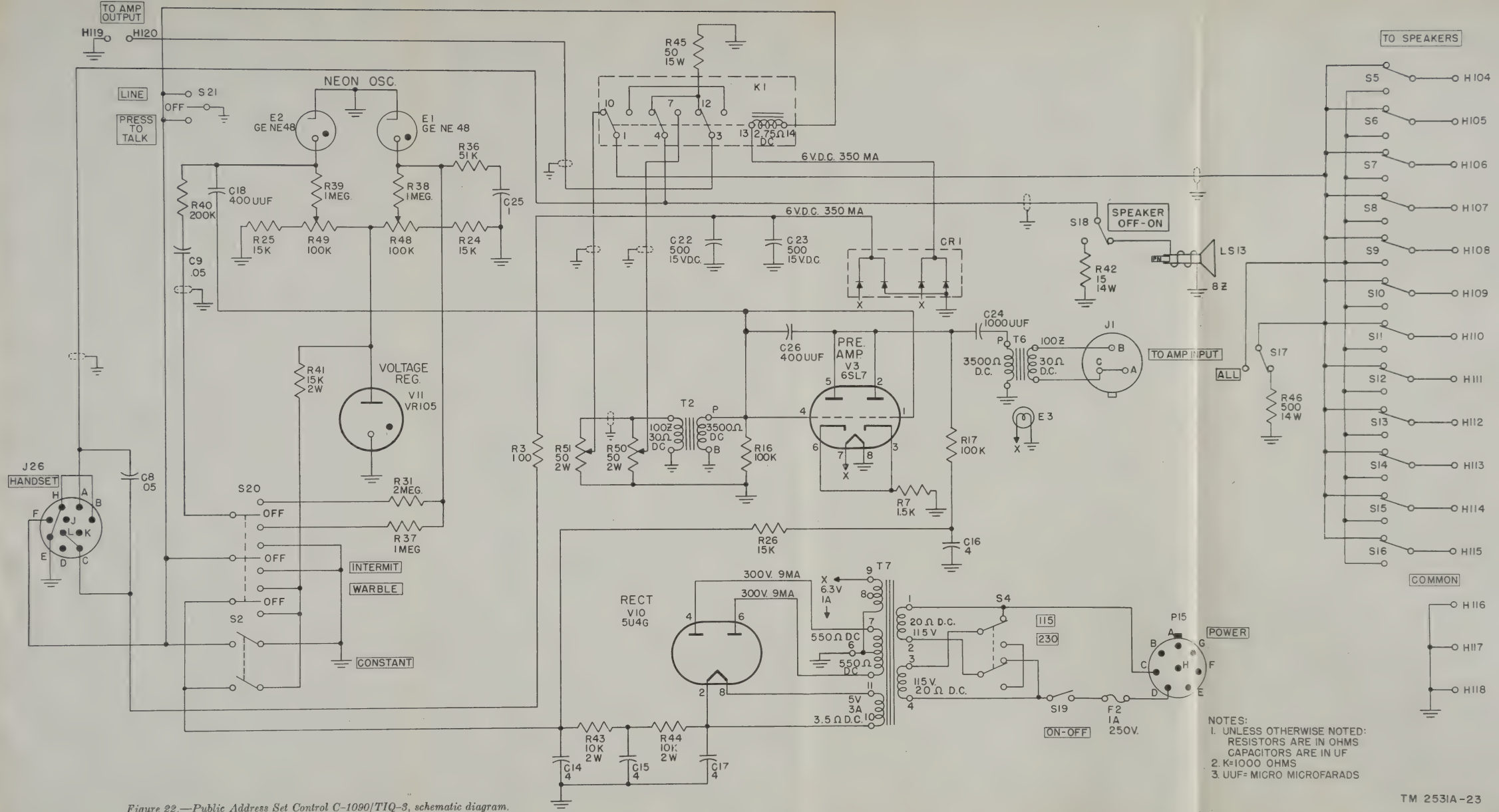


to filter capacitor C17. Capacitors C17, C15, and C14, in combination with resistors R43 and R44, form a filter for removing the ripple from the d-c output voltage. Rectifier CR1 is a metallic, two-section selenium rectifier. This device presents a high resistance to the flow of current through it in one direction and comparatively low resistance to the flow of current through it in the opposite direction. Therefore, if a-c is applied to the terminals of the rectifier, current flows only in one direction and produces a d-c voltage. The a-c for rectifier CR1 is supplied by the 6-volt step-down winding of transformer T7. One section of the voltage output of rectifier CR1 is connected to relay coil K1 when switch S21 is in either the up or the down position. The other section of the voltage output of CR1 is connected to connector J26 through resistor R3 for the operation of the microphone of Handset H–33D/PT. Resistor R3 reduces the d-c output voltage of rectifier CR1 to the proper value for the operation of the microphone. Capacitors C22 and C23 act as a ripple filter for the output voltage of rectifier CR1. That portion of rectifier CR1 connected from relay K1 to ground limits current surges due to the development of a cemf (counter electromotive force) and effectively prevents relay chatter.

34. Power Supply of Audio Frequency Amplifier AM–700/TIQ–3

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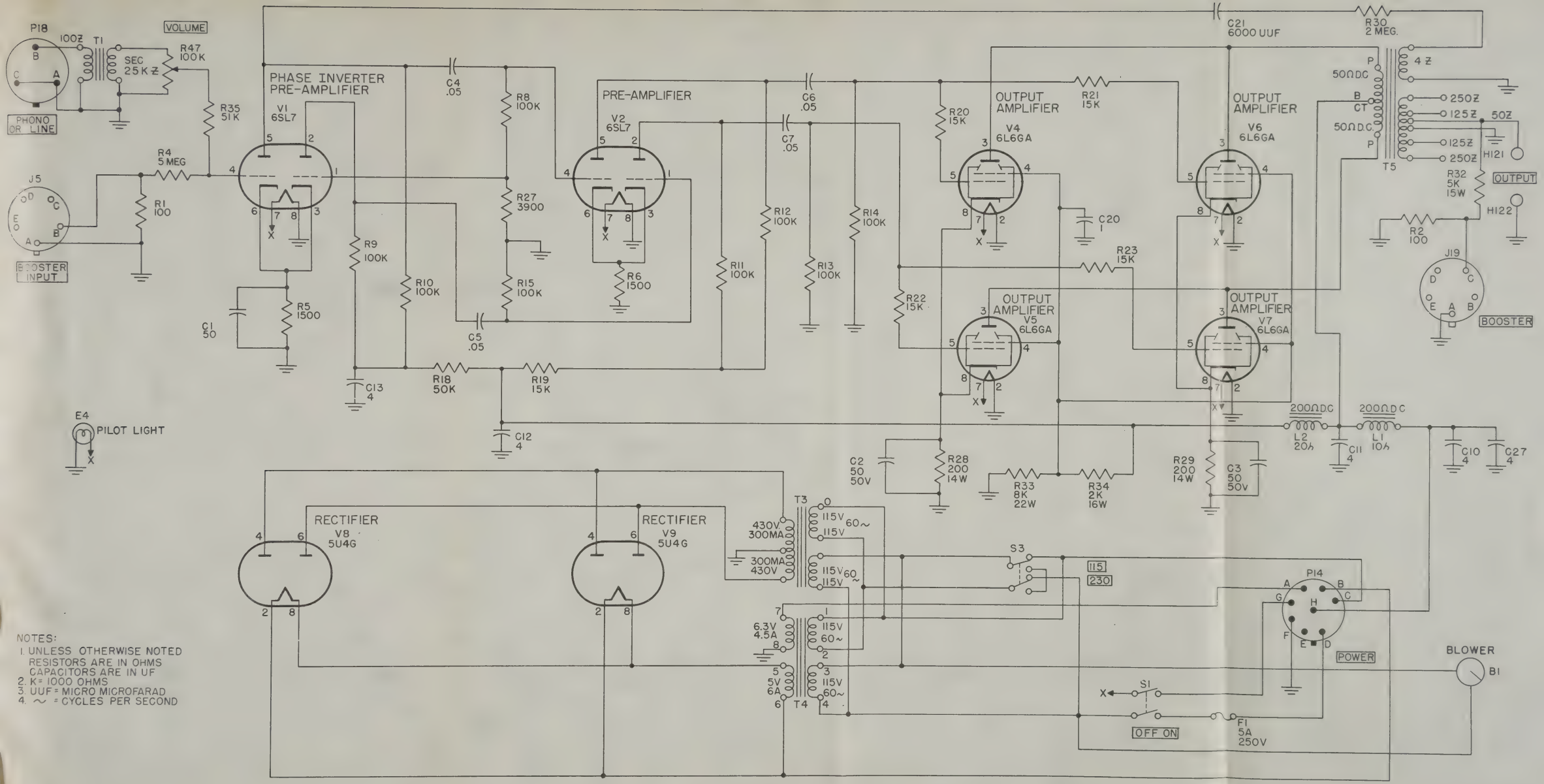


NOTES:
1. UNLESS OTHERWISE NOTED: RESISTORS ARE IN OHMS CAPACITORS ARE IN UF
2. K=1000 OHMS
3. UUF= MICRO MICROFARADS

Figure 22.—Public Address Set Control C-1090/TIQ-3, schematic diagram.

TM 2531A-23

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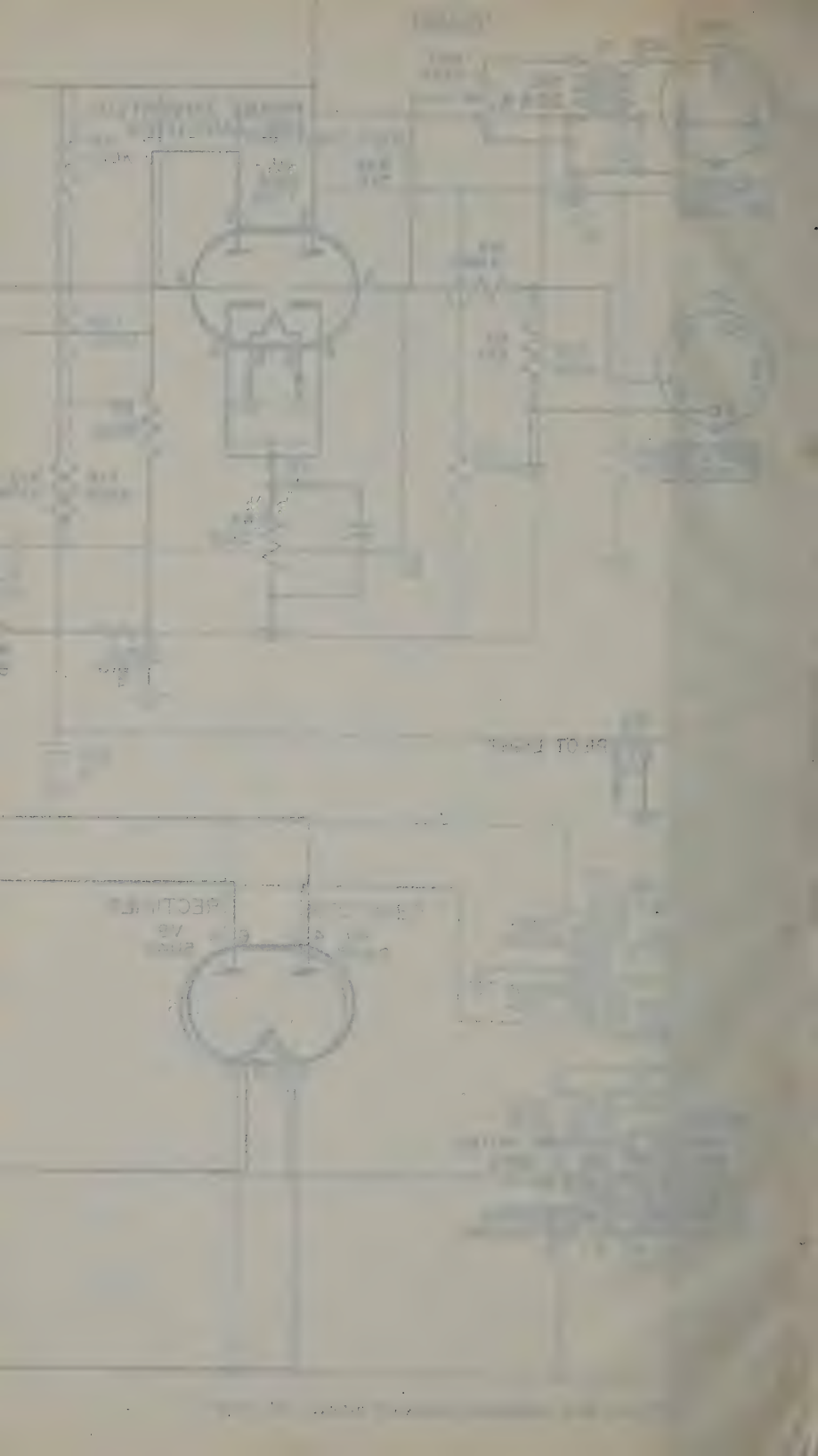


NOTES:
1. UNLESS OTHERWISE NOTED RESISTORS ARE IN OHMS CAPACITORS ARE IN UF
2. K = 1000 OHMS
3. UUF = MICRO MICROFARAD
4. ~ = CYCLES PER SECOND

Figure 23.—Audio Frequency Amplifier AM-700/TIQ-3, schematic diagram.

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smooths out the fluctuations in the d-c voltage output of rectifier tubes V8 and V9. Receptacle P14 may be used with appropriate adapters and circuit modifications to permit operation of the amplifier from an auxiliary source of d-c power, external to the amplifier.

35. Loudspeaker LS–104/TIQ–3

The speaker converts the audio frequency output of the amplifier and the control unit into acoustical power or sound and projects this sound into a specified area. The loudspeaker cables (field wire) conduct the audio output from binding posts H104 to H118 on the terminal board of control unit to the binding posts on the terminal board of the loudspeakers. Transformer T8 on the loudspeaker provides various impedance connections to match the output of the amplifier. Taps are provided at 0, 250, 500, 1,000, and 2,500 ohms on the terminal board of the loudspeaker. The voice coil of the loudspeaker is immersed in a steady magnetic field produced by a permanent magnet. When energized, the voice coil moves in accordance with the frequency and magnitude of the audio output. The voice coil is attached to a diaphragm which vibrates as the coil moves, and thus sound is produced. The horn of the loudspeaker couples the diaphragm efficiently to the air in front of the horn.

36. Intercommunication Feature

When the equipment is used as an intercommunication system, the circuits function exactly as described above, except that the loudspeakers function as a microphone and the receiver of Handset H–33D/PT, or the monitor speaker LS13 on the control unit, functions as the loudspeaker. When any one of switches S5 through S16 is placed in the ON position and switch S17 is placed in the OFF position, electrical energy generated by the loudspeaker is conducted to the primary of transformer T2 through the contacts of change-over relay K1 and across R51. Electrical energy is produced at the loudspeaker by the voice coil of the loudspeaker moving in a magnetic field supplied by a permanent magnet. The voltage thus produced is of low value, and line-matching transformer T8 is used as a step-up transformer to increase the voltage. From transformer T8, the electrical energy is conducted through the loudspeaker cables to the binding posts on the terminal board of the control unit. From here on, the parts function exactly as described above. After being amplified, the electrical energy is converted into sound by the receiver of Handset H–33D/PT or by monitor speaker LS13. Variable resistor R51 (TALK VOLUME) varies the input voltage received from the loudspeaker to the proper value for the operation of amplifier tube V3. When switch S18 is in the ON position, monitor loudspeaker LS13 is connected to the amplifier through the contacts of change-over relay

K1. When switch S18 is in the OFF position, resistor R42 loads the amplifier output transformer T5 and reduces the audio voltage to the proper value for the receiver of the handset. Resistor R45 provides a minimum load for the operation of monitor speaker LS13, or the receiver in the handset. Resistor R46 provides a minimum load when the remote loudspeakers are not connected.

37. Booster Amplifier

Provision has been made for the connection of a booster amplifier (J5 and J19 on the amplifier panel) to the amplifier for additional gain to permit the operation of additional speakers or to permit the operation of two or more public address sets from a single control location.

Section III. TROUBLE SHOOTING

38. General Trouble-Shooting Information

When troubles occur, the repairman must locate and correct them as rapidly as possible. By proper use of the following information, the operator can isolate the trouble quickly and thus save time. Consult the schematic diagrams for resistance and capacitance data. Refer to the illustrations of components with reference symbols which aid in locating and identifying parts.

a. Tubes. Before setting up an elaborate trouble-shooting procedure, replace the tubes with known good tubes to eliminate possible trouble from this source.

b. Visual Inspection. Make a thorough visual inspection in an attempt to locate the trouble. Check for loose connections, charred insulation, and charring or discoloration of resistors or capacitors. If inspection fails to locate the trouble, make voltage and resistance analyses of the components or circuits suspected of failure.

39. Voltage Measurements

a. General. Normal voltage values are an aid to the repairman, because most troubles either result from abnormal voltages or produce abnormal voltages. Voltage measurements always are made between two points in a circuit, and the circuit need not be interrupted.

(1) Complete information on normal operating voltages is given in the voltage-resistance charts (pars. 44 and 45). Unless otherwise specified, these voltages are measured between the indicated points and ground.

(2) Always begin by setting the voltmeter on the highest range so that it will not be damaged by overloading. Then, if it is necessary (to obtain increased accuracy), set the voltmeter to a lower range.

b. Voltmeter Loading. It is essential that the voltmeter resistance be at least 10 times as great as the resistance of the circuit across which the voltmeter is placed. If the voltmeter resistance is too low, it will indicate a lower voltage than the actual circuit voltage.

40. Resistance Measurements

a. Normal Resistance Values. A fault often will show up as a change in the resistance values. To assist in the localization of such faults, trouble-shooting data include the normal resistance values as measured at the tube sockets and at the resistor and capacitor board terminal points. The normal resistance values at any point can be determined by referring to the resistance values shown in the schematic diagrams (figs. 22 and 23), in the voltage-resistance charts (pars. 44 and 45), and by use of the resistor color code (fig. 25).

b. Precautions. Before making any resistance measurements, turn off the power. An ohmmeter is essentially a low-range voltmeter and battery. If the ohmmeter is connected to a circuit which already has voltage in it, the meter needle may be knocked off scale, and the meter movement may be damaged. Capacitors always must be discharged before resistance measurements are made to prevent damage to the meter movement.

c. Correct Use of Low and High Ranges. When checking the circuit continuity, set the ohmmeter at its lowest range. If the medium or high range is used, the pointer may indicate zero ohms, even if the resistance is as high as 500 ohms. When checking high resistances or measuring the leakage resistance of capacitors or cables, use the highest range. If a low range is used, the pointer may indicate infinite ohms, even though the actual resistance is less than a megohm.

d. Parallel Resistance Connections.

(1) In a parallel circuit, the total resistance is less than the smallest resistance in the circuit. This is important to remember when shooting trouble with the aid of a schematic diagram.

(2) If a resistance value is found to be less than expected, study the schematic to be certain that there are no circuits in parallel with the resistor that is being measured. Disconnect one terminal from the resistor and measure it again.

41. Capacitor Tests

a. Capacitor Defects. It often is necessary and desirable to check capacitors for leakage and open or short circuits. Although open circuits sometimes occur in paper-type capacitors because of the metal terminal tap pulling away from the tinfoil plates, this trouble is rare. The usual trouble in capacitors is a short circuit or leakage caused by the breakdown of the dielectric between the plates. This usually applies only to capacitors of the tinfoil-paper or mica type, since electrolytic capacitors normally show some leakage.

b. Open Capacitor. A capacitor suspected of being open can be checked by shunting a good capacitor across it. In audio circuits, the length of the leads of the test capacitor is not critical.

c. Kick Indication. A high-resistance voltohmmeter may be used to check for leakage in a paper or mica capacitor by means of the kick indication. To make this test, disconnect one end of a capacitor from its circuit. Set the ohmmeter to its highest range, and place the ohmmeter leads across the capacitor. A good capacitor should cause the needle to kick up the scale and fall back to infinity. A leaky capacitor will cause the needle to remain at some point on the scale other than infinity. An open capacitor will result in no deflection of the needle. The lower the capacitance, the smaller the deflection on the ohmmeter scale. The higher the capacitance, the greater the deflection on the ohmmeter scale (if the capacitor is normal). Capacitors lower than 50,000 $\mu\mu$f (micromicrofarads) usually do not produce a measurable kick.

d. Color Codes. The capacitor color codes (fig. 24) may be used to check the rated capacitor values of the capacitors in the equipment against the values shown on the schematic diagram.

42. Trouble-Shooting Hints

a. Effect of Low Screen or Plate Voltage. Low screen or plate voltage decreases the amplification of the stage. This type of fault can be located by resistance and voltage measurements.

b. Checking Cathode Voltage. When checking cathode voltage, a false reading may be obtained even if the cathode resistor actually is open, because the resistance of the voltmeter acts as the cathode resistor. Make a resistance check of this resistor with the power turned off.

c. Effect of Shorted Screen-Bypass Capacitor. A shorted screen-bypass capacitor will result in the output of the stage dropping to a very small value. It can be localized rapidly by either a voltage or a resistance measurement. After replacement of the capacitor, check the screen resistor for overload damage.

d. Effect of Open Coupling Capacitor. When a coupling capacitor between the plate of one stage and the control grid of the next stage opens, very little or no signal appears on the control grid of the second tube, even though there is a high signal voltage at the plate of the first tube.

e. Effect of Shorted Coupling Capacitor. When the coupling capacitor between the plate of one stage and the control grid of the next stage shorts out or leaks, a weak signal, or no signal, appears on the grid. The leaking, or shorted capacitor, allows a positive po-

tential to be applied to the control grid of the tube; this causes a large increase of plate current and considerable distortion with a loss in volume.

f. Open Grid Circuit. When the grid load resistor of a tube opens, the equipment will perform erratically. An open grid circuit will be disclosed by a resistance check of the stage.

g. Effect of Open Transformer. An open transformer will render the amplifier inoperative. No signal will appear on the grid of the following stage or, as in the case of the output transformer, no signal voltage will appear across the secondary terminals of the output transformer.

h. Effect of Shorted Transformer. When several or all turns of the primary or secondary of a transformer are shorted, a weak signal, or no signal, appears on the output terminals of the transformer.

43. Trouble-Shooting Chart

Symptom	Possible cause	Remedy
Pilot lamp E3 on control unit panel does not light when power ON-OFF switch is in ON position.	Fuse F2 burned out	Replace fuse.
	Pilot lamp E3 burned out	Replace lamp.
	Connector J10 or plug P10 on power Cord CX–49/TIQ–2 (W1) disconnected.	Tighten loose connections.
	Plug P13 on power Cord CX–53/TIQ–2 (W4) disconnected	Tighten loose connection.
	Plug P12 on power extension Cord CX–54/TIQ–2 (W5) disconnected.	Tighten loose connection.
	Plug P11 on power extension Cord CX–54/TIQ–2 (W6) disconnected.	Tighten loose connection.
	Plug P16 on power adapter Cord CX–55/TIQ–2 (W7) disconnected.	Tighten loose connection.
	Any of the preceding cords damaged	Replace damaged cord.
Pilot lamp E4 on amplifier panel does not light when power ON-OFF switch S1 is in ON position.	Fuse F1 burned out	Replace.
	Pilot lamp E4 burned out	Replace.
	Connector J11 or plug P9 on power Cord CX–49/TIQ–2 (W2) disconnected.	Tighten loose connection.
	Connectors or plugs on power cords W4, W5, W6, or W7 disconnected as described in 1 above.	Tighten loose connection.
Pilot lamps light but there is no output.	Volume control R47 on the amplifier and/or volume control R50 on the control unit not turned up high enough.	Turn up R47 or R50.
	Speaker switches S5 through S16 on the control unit panel not in ON position.	Place in ON position.
	PRESS TO TALK switch S21 on the control unit not depressed.	Depress switch S21.

Pilot lamps light but there is no output.	Connectors P17 and J26 on Electrical Special Purpose Cable Assembly CX–1815/U (W10) disconnected.	Tighten loose connection.
	Connectors P19 and J24 on handset cord (W11) disconnected.	Tighten loose connection.
	Loose connections at loudspeaker cable binding posts H104 to H118 on control unit terminal board E10.	Tighten loose connections.
	Loose connections at binding posts H119 and H120 on the control unit, or binding posts H121 and H122 on the amplifier.	Tighten loose connections.
	Connections reversed at binding posts H119, H120, H121, or H122.	Connect H119 to H122, and connect H120 to H121.
	Loose connections at connectors J7 or P7 on Electrical Special Purpose Cable Assembly CX–1931/U or at connectors J6 or P6 on Electrical Special Purpose Cable Assembly CX–1833/U (W8) or at connectors P8 or J25 on W9.	Tighten loose connections.
	Loose connections at binding posts on terminal board on loudspeaker.	Tighten loose connections.
	Defective handset	Replace.
	Defective tubes in amplifier or control unit	Replace.
	Defective loudspeakers	Replace defective drive unit or transformer.
Weak output	Improper voltage selection at switch S4 on control unit panel, or switch S3 on the amplifier panel.	Correct setting to correspond with voltage supplied.
	Low line voltage when Power Unit PE–214–( ) is used	Proceed as directed in TM 11–945, Power Units PE–214–B, and PE–214–C.
	Low line voltage when an external source of power is used	Report to central station.
	Volume control R50 on the control unit panel, or volume control R47 on the amplifier panel not turned up.	Turn up controls.
	Improper impedance matching at loudspeakers	Make connections at 500-ohm tap on loudspeaker transformer.

43. Trouble-Shooting Chart—Continued

Symptom	Possible cause	Remedy
Weak output	Defective handset	Replace.
	Defective tubes in amplifier or control unit	Replace.
	One or more defective loudspeakers	Replace defective drive unit or transformer.
Distorted output	Defective tubes, incorrect control settings, poor connections, defective loudspeakers or handset.	If these items operate properly, the trouble is in the control unit or amplifier circuits. Return the defective unit to maintenance depot for repairs.
Strong but intermittent output	Loose connections in cables or external wiring	Tighten loose connections.
	Defective tubes	Replace.
	Loose tube socket	Tighten or replace.
	Defective wiring in amplifier or control unit	Substitute good unit and return defective unit to repair depot.
	Defective handset	Replace.
	Open wiring in transformer T8 on loudspeakers	Replace loudspeaker.
	Loose connections at binding posts on terminal board on control unit.	Tighten loose connections.
Hum	Defective tubes	Replace.
	Open circuit in microphone cord or plug, with volume control R50 on control unit turned up fully.	Check all connections and cords.
	Loose connection or open circuit between control unit and amplifier, with volume controls on full.	Check and tighten all connections.
	Defective amplifier unit or control unit	Return defective unit to repair depot.
Weak, or no output, or strong intermittent output when tone generators are used.	See causes listed above under these heads	Apply remedies suggested above under these heads.
	Defective lamps E1 and E2	Replace.
	Defective amplifier unit or control unit	Return defective unit to repair depot.

44. Voltage and Resistance Chart for Control Unit (Meter Sensitivity: 10,000 Ohms per Volt)

Measured from—	To—	D-c voltage	A-c voltage	Resistance (ohms)
V3 plates No. 1 and 2, pins No. 2 and 5	Chassis ground	130		10 megohms.
V3 grids No. 1 and 2, pins No. 1 and 4	do			3,500.
V3 cathodes No. 1 and 2, pins No. 3 and 6	do	1¾		1,500.
V10 plate No. 1, pin No. 4	do		275	600.
V10 plate No. 2, pin No. 6	do		275	600.
V10 filament, pin No. 2	do	390		10 megohms.
K1 coil (closed circuit)	do	1. 5		
K1 coil (open circuit)	do	2. 5		4.
V11 pin No. 2	do			57,000.
V11 pin No. 5	do	105		

45. Voltage and Resistance Chart for Amplifier (Meter Sensitivity: 10,000 Ohms per Volt)

Measured from—	To—	D-c voltage	A-c voltage	Resistance (ohms)
V1 pins No. 2 and 5, plates No. 1 and 2	Chassis ground	220		160, 000
V1 pin No. 1, grid No. 1	do			50, 000
V1 pin No. 4, grid No. 2	do			4, 000
V1 pins No. 3 and 6, cathodes No. 1 and 2	do	2. 5		1, 500
V2 pins No. 2 and 5, plates No. 1 and 2	do	260		150, 000
V2 pin No. 1, grid No. 1	do			104, 000
V2 pin No. 4, grid No. 2	do			90, 000
V2 pins No. 3 and 6, cathodes No. 1 and 2	do	3		1, 500
V4 pin No. 3, plate	do	400		10, 000
V4 pin No. 4, screen-grid	do	310		8, 000
V4 pin No. 5, control grid	do			115, 000
V4 pin No. 8, cathode	do	23		200

45. Voltage and Resistance Chart for Amplifier (Meter Sensitivity: 10,000 Ohms per Volt)—Continued

Measured from	To—	D–c voltage	A–c voltage	Resistance (ohms)
V5 pin No. 3, plate	Chatsis ground	400		10, 000
V5 pin No. 4, screen grid	do	310		8, 000
V5 pin No. 5, control grid	do			115, 000
V5 pin No. 8, cathode	do	23		200
V6 pin No. 3, plate	do	400		10, 000
V6 pin No. 4, screen	do	310		8, 000
V6 pin No. 5, grid	do			115, 000
V6 pin No. 8, cathode	do	23		200
V7 pin No. 3, plate	do	400		10, 000
V7 pin No. 4, screen	do	310		8, 000
V7 pin No. 5, grid	do			115, 000
V7 pin No. 8, cathode	do	23		200
V8 pin No. 8, filament	do	420		10, 000
V8 No. 1 pin No. 4, plate No. 1	do		410	35
V8 No. 2 pin No. 6, plate No. 2	do		410	35
V9 pin No. 8, filament	do	420		10, 000
V9 No. 1 pin No. 4, plate No. 1	do		410	35
V9 No. 2 pin No. 6, plate No. 2	do		410	35
A-f choke coil L1				120
A-f choke coil L2				200
A-f choke coil L1	Chassis ground to input side			10, 000
Do	Chassis ground to output side			10, 100
A-f choke coil L2	Chassis ground to input side			10, 100
Do	Chassis ground to output side			10, 200
T3 transformer	Total secondary			70
Do	One half of secondary			35
Do	Primary O–115			2. 5
Do	do			2. 5

Section IV. REPAIRS

46. General

a. Failure of Part Caused by Another Defective Part. When a defective part, such as a burned-out resistor or transformer, is located, check the associated circuit thoroughly to determine whether this condition is caused by another faulty part. For example, a shorted capacitor may destroy a transformer or a resistor in the associated circuit. If a transformer or a resistor is replaced without replacing the defective capacitor which caused the breakdown, the new part will be burned out in the same manner.

b. Soldering. It is important to make good solder joints; poorly soldered connections can cause trouble which is difficult to find. Use the soldering iron carefully so that insulation on wiring and other adjacent parts are not damaged by overheating. Use only enough solder to make a good joint. Do not permit drops of solder to fall inside the chassis; they may cause short circuits and damage the equipment. Tag each lead to insure that the part can be replaced correctly and quickly.

47. Fuse Replacement

Remove fuse F1 or F2 as follows:

a. Turn the knurled fuseholder counterclockwise until the holder can be removed.

b. Remove the defective fuse from the holder and replace it with a good one.

c. Reinsert the holder in the chassis fuse receptacle and turn it clockwise until it is handtight.

48. Pilot Lamp Replacement

Replace pilot lamps E3 or E4 as follows:

a. Remove the knurled holding ring of the pilot lamp assembly by turning it counterclockwise. To remove the pilot lamp, push the bulb into the socket, turn it slightly to the left, and remove it.

b. Push the new bulb into the socket and turn it slightly clockwise until it is locked in place and replace the knurled holding ring.

49. Vacuum Tube and Glow Lamp Replacement

To gain access to the tubes and glow lamps, it is necessary to remove the amplifier and the control unit from their cases. Remove the three machine screws located on each side of the front panels of the amplifier and control unit and pull the units from their cases.

a. Release the tube clamps which secure the tubes and lift the tubes straight out of their sockets.

b. To remove glow lamp E1 or E2, press down on the lamp, twist

slightly to the left, and lift it. To replace the lamp, press it down in the socket and twist it slightly to the right.

Caution: Note the number on the replacement tube and check it with the number on the socket or chassis before inserting.

50. Audio Frequency Amplifier AM–700/TIQ–3

If the amplifier is not functioning properly, check the voltages at the tube sockets of tubes V1, V2, V4, V5, C6, V7, V8, and V9 with a d-c voltmeter. The correct voltages are shown in the voltage and resistance charts (pars. 44 and 45). If proper voltages are not obtained at any tube, remove the power and check the circuit of the tube and all its components with an ohmmeter for short or open circuits.

51. Public Address Set Control C–1090/TIQ–3

If the control unit is not functioning properly, check the voltages at the tube sockets of tubes V3, V10, and V11 with a d-c voltmeter. The correct voltages are shown in the voltage and resistance charts (pars. 44 and 45). If proper voltages are not obtained at any tube, remove the power and check the circuit of the tube and all of its components with an ohmmeter for short or open circuits.

52. Handset H–33D/PT

a. To test the microphone (transmitter) of the handset, apply an ohmmeter across terminals C and D of connector P19. A reading of 75 to 250 ohms should be obtained, depending on atmospheric conditions and the position of carbon granules in the transmitter. The reading should vary with the movement of the handset. If an incorrect reading is obtained, turn in the handset for exchange or repair.

b. To test the continuity of the receiver of the handset, check across terminals A and B of connector P19 with an ohmmeter. A reading of approximately 120 ohms should be obtained. If the reading is incorrect, turn the handset in for exchange or repair.

53. Loudspeaker LS–104/TIQ–3

In general, it will be found that if trouble does develop in the loudspeaker, it will be necessary to replace either the complete diaphragm head assembly or the line-matching transformer T8. To test the loudspeaker, proceed as follows:

a. Unsolder the two wires from the driver unit, noting the solder lug to which each wire is connected.

b. Using the low-resistance scale on the ohmmeter, check across the two terminal lugs for a continuity reading of approximately 15 ohms. While this is being done, a click should be heard.

Note. If no reading is obtained or no click is heard, a new driver unit should be installed. If a reading is obtained and a click is heard, the driver unit is in operating condition and the trouble probably is located in line-matching transformer T8.

c. To test transformer T8, use the low-resistance scale on the ohmmeter to check the secondary of the transformer. The reading should be approximately 3.3 ohms, and a substantially higher reading should be obtained at the primary terminals. If the primary and secondary readings are satisfactory, the trouble probably is not in the transformer.

d. To replace the driver unit, remove it from the loudspeaker frame by turning the unit counterclockwise.

e. The replacement driver unit is installed by turning it clockwise into the loudspeaker frame.

f. Solder the two wires back on the driver unit, observing proper polarity.

g. To replace a defective transformer, remove the two mounting screws holding the transformer to the terminal board.

h. Unsolder the four wires connecting the transformer to the binding posts on the terminal board.

i. Replace the new transformer T8 by mounting the transformer on the terminal board and resoldering the four wires.

Section V. FINAL TESTING

54. Test Equipment Required

Quantity	Equipment nomenclature
1	Audio Oscillator TS–421/U.
1	Spectrum Analyzer TS-723/U.
2	Electronic Multimeter ME–6/U.
1	Multimeter TS–352/U.
1	Variac General Radio (750 watts).

55. Determining Frequency Response of Amplifier

a. Connect the ouput of Audio Oscillator TS–421/U through a 100-ohm, ½-watt resistor to the PHONO OR LINE input of the amplifier.

b. Connect Electronic Multimeter ME–6/U (No. 1) across the output of the oscillator.

c. Connect a 50-ohm, 50-watt resistor across the OUTPUT terminals of the amplifier.

d. Connect another ME–6/U (No. 2) across the resistor.

e. Adjust the frequency of the oscillator to 1,000 cycles.

f. Turn the VOLUME CONTROL on the amplifier to maximum.

g. Adjust the output voltage of the oscillator until Electronic Multimeter ME–6/U (No. 2) reads 50 volts.

Note. Meter No. 1 should read 0.0022 volt or less.

h. Proceed as follows for making the test at other frequencies:

(1) Set the oscillator frequency output at 50 cps and adjust the oscillator attenuator to produce the oscillator voltage output obtained at 1,000 cps (cycles per second) (*g* above).

(2) The reading on meter No. 2 should not be less than 44 volts.

(3) Repeat (1) and (2) above for the following frequencies: 100, 1,000, 5,000, 10,000, and 15,000 cps.

Note. Meter No. 2 reading must not fall below 44 volts at any of the preceding frequencies.

56. Distortion Test of Amplifier

a. Connect Spectrum Analyzer TS–723/U across the 50-ohm amplifier output resistor.

b. Adjust the frequency of the oscillator, and that of the spectrum analyzer to the frequencies listed in paragraph 55*h*.

c. Maintain the output voltage of the oscillator at that value which produces 50 volts as read on meter No. 2. The frequency distortion percentages should not exceed the following values:

Frequency (cps)	Percent distortion
50	10. 0
100	5. 0
1,000	5. 0
5,000	7. 5
10,000	10. 0

57. Booster Output of Amplifier

a. Adjust the oscillator output voltage to that value necessary to produce 50 volts as read on meter No. 2.

b. Disconnect meter No. 2 from across the amplifier OUTPUT terminals and connect it across the amplifier BOOSTER terminals. Meter No. 2 should read between 0.9 and 1.5 volts.

58. Hum Level of Amplifier

a. Connect meter No. 2 back across the OUTPUT terminals of the amplifier.

b. Disconnect the oscillator from the amplifier input and connect the 100-ohm, ½-watt resistor across the amplifier input terminals. Meter No. 2 should read less than 0.20 volt of hum for any setting of the volume control of the amplifier.

59. Frequency Response of Control Unit

a. Connect the oscillator output to contacts A and B of the HANDSET connector on the control unit.

b. Connect meter No. 1 across the oscillator output terminals.

c. Connect a 100-ohm, 1-watt resistor, and meter No. 2 across the TO AMP INPUT terminals.

d. Turn the ALL speaker switch and speaker switches 1 through 12 to the OFF position.

e. Turn the LISTEN and TALK volume controls to maximum.

f. Set INTERMIT-WARBLE switch to the neutral position.

g. Turn the CONSTANT switch to the OFF position.

h. Turn the PRESS-TO-TALK switch to the LINE position.

i. Turn the SPEAKER switch to the OFF position.

j. Adjust the frequency of the oscillator to 1,000 cycles.

k. Adjust the output level of the oscillator until meter No. 2 reads 0.07 volt. Meter No. 1 should read between 0.022 and 0.035 volt.

l. Repeat tests for the frequencies indicated in the chart below. Maintain oscillator output between 0.022 and 0.035 volt. Meter No. 1 should read between the limits indicated in the chart below.

Frequency	Minimum volts	Maximum volts
300	0. 025	0. 036
2,000	. 070	. 090
3,000	. 070	. 090
4,000	. 050	. 079
5,000	. 040	. 068
8,000	. 018	. 033

60. Tone Generator Adjustment Test on Control Unit

a. Disconnect the audio oscillator from the test circuit.

b. Set meter No. 2 selector switch on the .1 scale.

c. Turn the CONSTANT switch to the ON position.

d. With a screw driver, adjust potentiometer R49 on the control unit to obtain slightly less than maximum reading on meter No. 2 (which should be at least 0.04 volt).

e. Turn the CONSTANT switch to the OFF position.

f. Throw the INTERMIT-WARBLE switch to the INTERMIT position.

g. Adjust potentiometer R48 to obtain the maximum indication on meter No. 2 (which should be at least 0.04 volt).

h. Throw the INTERMIT-WARBLE switch to the WARBLE position.

i. Adjust potentiometer R48 to obtain the maximum reading on meter No. 2 (which should be at least 0.04 volt).

61. Miscellaneous Tests on Control Unit

a. Connect Electrical Special Purpose Cable Assembly CX–1931/U between the TO AMP INPUT on the control unit and the PHONO OR LINE on the amplifier. Connect the TO AMP OUTPUT terminals on the control unit to the OUTPUT terminals on the amplifier. Connect meter No. 2 across the OUTPUT terminals on the amplifier. Connect 115 volts ac to both the control unit and the amplifier. Connect a 50-ohm load resistor across speaker switch No. 1 COMMON on the control unit.

b. Turn the POWER switch on the amplifier to the ON position.

c. Turn the VOLUME control on the amplifier to maximum.

d. Make the following adjustments on the control unit:

(1) Turn the POWER switch to the ON position.
(2) Turn the TALK and LISTEN volume controls to maximum.
(3) Turn CONSTANT and INTERMIT-WARBLE switches to the OFF position.
(4) Turn the PRESS-TO-TALK switch to line position.
(5) Turn the SPEAKER switch to the OFF position.
(6) Turn the ALL speaker switch to the OFF position.
(7) Turn speaker switches 1 through 12 to the OFF position. Meter No. 2 connected across the output should read less than 10 volts.

e. Vary the position of the VOLUME controls on the control unit as follows:

(1) LISTEN VOLUME to maximum; TALK VOLUME to minimum.
(2) LISTEN VOLUME to minimum; leave TALK VOLUME at minimum.
(3) Leave LISTEN VOLUME at minimum; TALK VOLUME to maximum. Meter No. 2 at each position of the VOLUME controls should read less than 10 volts.

f. Turn the ALL speaker switch to the ON position.

g. Vary the position of the VOLUME controls as shown in *e* above. Meter No. 2 should read less than 10 volts at each position of the VOLUME controls.

h. Talk into the microphone while varying the volume controls. Meter No. 2 connected across the output should vary in accordance with the speech signal and should indicate at least 50 volts on peaks.

i. Turn the SPEAKER switch to the ON position.

j. Turn the SPEAKER switch, connected to 50-ohm load, to the ON position.

k. Talk into the monitor speaker from a distance of approximately 12 inches. Meter No. 2 connected across the output should read at least 50 volts.

l. Turn the PRESS-TO-TALK switch to the LISTEN position (neutral).

m. Turn the SPEAKER switch and all other speaker switches to the OFF position.

n. Turn the ALL speaker switch to the OFF position.

o. Vary the position of both VOLUME controls as in *e* above. Meter No. 2 connected across the output should read less than 10 volts.

p. Turn the ALL speaker switch to the ON position and repeat the directions given in *o* above.

q. Turn the CONSTANT switch to the ON position.

r. Turn the SPEAKER switch, connected to 50-ohm load, to the ON position. Meter No. 2 connected across the output should read 45 volts or more.

s. Turn the INTERMIT-WARBLE switch up and down. Meter No. 2 connected across the output should read 45 volts or more.

62. Adjustment of Tone Oscillators

The only adjustment required is in tone oscillators E1 and E2. The oscillation point of tone oscillators E1 and E2 is somewhat critical. The two screw-driver-slot adjustable resistors R48 and R49 are located on top of the control unit chassis. These resistors control the voltages applied to E1 and E2. To adjust these resistors for correct settings, proceed as follows:

a. Set up the public address set in the operating position with power applied.

b. Place the CONSTANT switch in the CONSTANT position.

c. Adjust resistor R49 until a steady tone is heard over the remote loudspeakers.

d. Return the CONSTANT switch to the OFF position.

e. Place the INTERMIT-WARBLE switch in the INTERMIT position.

f. Adjust resistor R48 until a series of short tone dashes is heard on the loudspeakers.

g. Place the INTERMIT-WARBLE switch in the WARBLE position. A warbling audio tone signal should be heard. Readjust resistor R48 for the proper warble tone.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

63. Repackaging

a. Clean and dry the equipment.

b. Use as much of the original packing material as is available.

c. Repackage the equipment as shown in figure 11.

d. Close the lids of the cases securely and place each case in a corrugated-fiberboard carton.

e. Store the packaged equipment in a dry place; maintain an even temperature if possible.

64. Marking

a. Interior Marking. Mark the interior package with the Signal Corps stock number, quantity, description, and technical markings where they apply, in accordance with the requirements of Signal Corps Instructions No. 726–15.

b. Exterior Marking. Mark shipping containers that have identical items in accordance with the requirements of United States Army Specifications 100–2E.

Section II. DEMOLITION TO PREVENT ENEMY USE

65. Methods of Demolition

a. Smash. Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

b. Cut. Use axes, handaxes, machetes.

c. Burn. Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

d. Explode. Use firearms, grenades, TNT.

e. Dispose. Bury in slit trenches, fox holes, other holes. Throw into streams. Scatter.

f. Other. Use anything immediately available for destruction of this equipment.

66. Destruction of Components

When ordered by your commander, destroy all equipment to prevent its being used or salvaged by the enemy.

a. Smash (par. 65*a*) the cases, panels, controls, loudspeakers, connectors, switches, tubes, and all other electrical or mechanical parts, moving or fixed.

b. Cut (par. 65*b*) all cases, cords, and cables.

c. Burn (par. 65*c*) all cases, cords, diagrams, and technical manuals.

d. Bury or scatter (par. 65*e*) all remaining parts of the equipment.

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 Bulletin

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

3. Auxiliary Equipment and Test Equipment

TM 11–303 ..... Test Sets I–56–C, I–56–D, I–56–H, and I–56–J.
TM 11–945 ..... Power Unit PE–214–B.
TM 11–2613 ..... Voltohmmeter I–166.
TM 11–2624B ..... Voltohmmeters, TS–294/U, TS–294B/U, and TS–294C/U.
TM 11–2626 ..... Test Unit I–176, I–176–A, and I–176–B.
TM 11–2627 ..... Tube Tester I–177 and I–177–A.
TM 11–4700 ..... Electrical Indicating and Measuring Instruments Repair Instructions.
TM 11–5527 ..... Multimeter TS–352/U.

4. Painting, Preserving, and Lubrication

TB SIG 13 ..... Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69 ..... Lubrication of Ground Signal Equipment.
TM 9–2851 ..... Painting Instructions for Field Use.

5. Camouflage, Decontamination, and Demolition

FM 5–20 ..... Camouflage, Basic Principles.

FM 5–25 Explosives and Demolitions.
TM 3–220 Decontamination.

6. Other Publications

FM 72–20 Jungle Warfare.
SR 700–45–5 Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247).
SR 745–45–5 / AFR 71–4 Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD–66 (Army) and AF–MC–U2 (Air Force)).
TB SIG 25 Preventive Maintenance of Power Cords.
TB SIG 66 Winter Maintenance of Signal Equipment.
TB SIG 72 Tropical Maintenance of Ground Signal Equipment.
TB SIG 75 Desert Maintenance of Ground Signal Equipment.
TB SIG 123 Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 178 Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219 Operation of Signal Equipment at Low Temperatures.
TB SIG 223 Field Expedients for Wire and Radio.
TM 11–455 Radio Fundamentals.
TM 11–661 Electrical Fundamentals (Direct Current).
TM 11–681 Electrical Fundamentals (Alternating Current).
TM 11–4000 Trouble Shooting and Repair of Radio Equipment.

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. 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. Public Address Set AN/TIQ–3A (Sig C Stock No. 6C–200–3)

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
	AUDIO FREQUENCY AMPLIFIER AM–700/TIQ–3: 50 w. (See following paragraph 2 for parts.)	Audio-power amplifier	2C448A–700.
	PUBLIC ADDRESS SET CONTROL C–1090/TIQ–3. (See following paragraph 3 for parts.)	Preamplifies handset output and generates tone signals.	2C684–1090.
	LOUDSPEAKER LS–104/TIQ–3: PM field; 25 w. (See following paragraph 4 for parts.)	Converts electrical energy into mechanical energy.	6C42–104.
	MISCELLANEOUS COMPONENTS. (See following paragraph 5 for parts.)		

2. Audio Frequency Amplifier AM–700/TIQ–3

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
B1	BLOWER: centrifugal; motor, 1/20 hp, 3,000 rpm; 115 v ac, 60 cyc, single phase.	Ventilates power tubes of amplifier	6Z978–18.
A3	BRACKET: switch-locking; Z shape; 1¾″ lg x ¾″ wd x 11/16″ h.	Safety lock for input-power switch	2Z1240–13.
C21	CAPACITOR, fixed: paper dielectric; 6,000 μμf; 600 vdcw.	Feedback coupling capacitor from T5 to V1.	3DA6–140.
C4, C5, C6, C7	CAPACITOR, fixed: paper dielectric; 50,000 μμf; 600 vdcw.	C4—Couples plate 1 of V1 to grid 1 of V2. C5—Couples plate 2 of V1 to grid 2 of V2. C6—Couples plate 1 of V2 to grid 1 of V4 and grid 1 of V6. C7—Couples plate 2 of V2 to grid 1 of V5 and V7.	3DA50–259.
C20	CAPACITOR, fixed: paper dielectric; 1 μf; 600 vdcw.	Screen bypass for V4 and V5	3DB1–91.
C10, C11, C12, C13, C27.	CAPACITOR, fixed: paper dielectric; 4 μf; 600 vdcw.	C10—Filters power output of V8 and V9. C11 and C12—Filter high voltage of V8 and V9. C13—Decouples plate circuits of V1 from B power supply. C27—Filters power output of V8 and V9.	3DB4–279.
C1, C2, C3	CAPACITOR, fixed: electrolytic; 50 μf; 50 vdcw	C1—Cathode bypass for V1 C2—Cathode bypass for V4 and V5. C3—Cathode bypass for V6 and V7.	3DB50–103.

	CASE: Case CY–38/TIQ–2	Houses amplifier	2Z1891–38.
	CLEANER: air; steel wool; 5″ lg x 5″ wd x 1″ thk	Filters air intake	6Z3856–54.
P18	CONNECTOR: receptacle; 3 rd male cont; pol; straight type.	Input receiving connector for PHONO or LINE to amplifier.	2Z3023–5.
J5, J19	CONNECTOR: receptacle; 5 rd female cont; pol; straight type.	J5—Input connector for external-booster amplifier. J19—Output connector for booster voltage.	2ZK7409–20.
P14	CONNECTOR: receptacle; 8 rd male cont; pol; straight type.	Input-power connector	2Z711822.
V8, V9	ELECTRON TUBE: 5U4G; rectifier	Provide plate voltages for amplifier	2J5U4G.
V4, V5, V6, V7	ELECTRON TUBE: 6L6GA; power tube	Output-power amplifiers	2J6L6GAY.
V1, V2	ELECTRON TUBE: 6SL7GT; twin triode	V1—Phase inverter V2—Amplifies output of V1.	2JSL7GT.
F1	FUSE, cartridge: 5 amp; 1¼″ lg x ¼″ dia	Protects circuits against overload	3Z2605.2.
E5	FUSEHOLDER: extractor post type; 2⅜″ lg x 13/16″ dia.	Holder for F1	3Z3275.
E7	KNOB: rd; black phenolic; 1⅛″ dia x ⅝″ thk; for ¼″ dia shaft.	Regulates volume control	2Z5854.
E4	LAMP, incandescent: 6–8 v, .25 amp; miniature bayonet base.	ON-OFF indicating lamp	2Z5927.
J23	LIGHT, indicator: with lens; for miniature bayonet lamp.	Power ON-OFF indicating lamp	2Z5991–17.
H121, H122	POST, binding: screw type; 1 5/32″ h x 19/32″ dia	Provide output termination for amplifier.	3Z737–19.
	POST, supporting: 3¼″ lg x .164″ dia	Supports tube clamps	2Z7259–85.
	POST, supporting: 4½″ lg x .164″ dia	Same as above	2Z7259–86.
L1	REACTOR: filter choke; 10 hy at 250 ma dc; HS metal case.	Filters output of V8 and V9	3C573–6.
L2	REACTOR: filter choke; 20 hy at 50 ma dc; HS metal case.	Same as L1	3C573–7.

2. Audio Frequency Amplifier AM–700/TIQ–3—Continued

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
R1, R2	RESISTOR, fixed: WW; 100 ohms; ½ w	R1—Couples BOOSTER INPUT to input of V1. R2—Booster-output voltage-dropping resistor.	3RU25607.
R28, R29	RESISTOR, fixed: WW; 200 ohms; 14 w	R28—Grid-bias resistor for V4 and V5. R29—Grid-bias resistor for V6 and V7.	3RW20120.
R5, R6	RESISTOR, fixed: Composition; 1,500 ohms; ½ w	R5—Grid-bias resistor for V1 R6—Grid-bias resistor for V2.	3RC20BF152K.
R34	RESISTOR, fixed: WW; 2,000 ohms; 18 w	Screen grid voltage-dropping resistor	3RW26152.
R27	RESISTOR, fixed: composition; 3,900 ohms; ½ w	Grid resistor for V1 grid 2	3RC20BF392K.
R32	RESISTOR, fixed: WW; 5,000 ohms; 18 w	Booster voltage-dropping resistor	3RW28532.
R33	RESISTOR, fixed: WW; 8,000 ohms; 30 w	Screen grid voltage-dropping resistor	3RW29714.
R19, R20, R21, R22, R23.	RESISTOR, fixed: composition; 15,000 ohms; ½ w	R19—Decouples plate of V2 R20—Suppresses parasitic oscillations of V4. R21—Suppresses parasitic oscillations of V6. R22—Suppresses parasitic oscillations of V5. R23—Suppresses parasitic oscillations of V7.	3RC20BF153K.
R18, R35	RESISTOR, fixed: composition; 51,000 ohms; ½ w	R18—Decouples plate of V1 R35—Isolates PHONO or LINE input from BOOSTER INPUT.	3RC20BF513J.

R8, R9, R10, R11, R12, R13, R14, R15.	RESISTOR, fixed: composition; 100,000 ohms; ½ w	R8—Ground-return resistor for grid 1 of V2. R9—Plate-dropping resistor for plate 2 of V1. R10—Plate-dropping resistor for plate 1 of V1. R11—Plate-dropping resistor for plate 2 of V2. R12—Plate-dropping resistor for plate 1 of V2. R13—Grid-return resistor for V5 and V7. R14—Grid-return resistor for V4 and V6. R15—Grid-return resistor for grid 2 of V2.	3RC20BF104K.
R30	RESISTOR, fixed: composition; 2 meg; ½ w	Limits inverse feedback voltage to plate of V1.	3RC20BF205J.
R4	RESISTOR, fixed: composition; 5.1 meg; ½ w	Decouples BOOSTER INPUT from PHONO or LINE input.	3RC20BF515J.
R47	RESISTOR, variable: composition; 100,000 ohms; ¼ w.	Controls input voltage to grid of V1	3RV51015.
	RETAINER, electron tube: $2\frac{13}{32}$″ lg x $1\frac{7}{16}$″ wd x $\frac{23}{32}$″ d.	Retains tubes	2Z1619–79.
	RETAINER, electron tube: $2\frac{9}{16}$″ lg x $2\frac{1}{8}$″ wd x ¾″ d.	Retains tubes	2Z2643.138.

2. Audio Frequency Amplifier AM–700/TIQ–3—Continued

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
X1, X2, X4, X5, X6, X7, X8, X9.	SOCKET, electron tube: medium size; 8 cont	X1—Receives tube V1 X2—Receives tube V2. X4—Receives tube V4. X5—Receives tube V5. X6—Receives tube V6. X7—Receives tube V7. X8—Receives tube V8. X9—Receives tube V9.	2Z8678.327.
S1	SWITCH, toggle: DPST; 30 amp	Power ON-OFF switch	3Z9863–52K.1.
S3	SWITCH, toggle: DPDT; 30 amp	Determines operating voltage of amplifier.	3Z9863–52N.1.
T1	TRANSFORMER, audio frequency: input type; $1\frac{13}{16}''$ dia x $2\frac{1}{2}''$ h.	Couples audio input to grid of V1	2Z9631.203.
T5	TRANSFORMER, audio frequency: plate coupling type; $4\frac{15}{32}''$ dia x $5\frac{1}{2}''$ h.	Audio-output transformer	2Z9632.268.
T4	TRANSFORMER, power-step-down; fil type; input 115/230 v ac, 50/60 cyc; output 5 v at 6 amp and 6.3 v at 4.5 amp.	Supplies filament voltage to amplifier unit.	2Z9606–8.
T3	TRANSFORMER, power-step-up; plate type; input 115/230 v ac, 50/60 cyc; output 860 v at 300 ma, ct.	Supplies plate voltage in amplifier	2Z9607–19.

3. Public Address Set Control C–1090/TIQ–3

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
A4	BRACKET: switch locking; Z shape; 1¾″ lg x ¾″ wd x 11/16″ h.	Safety lock for input switch	2Z1240–13.
C18, C26	CAPACITOR, fixed: mica dielectric; 390 μμf; 500 vdcw.	C18—Couples output of E1 and E2 to grids of V3. C26—Neutralizes plate to grid capacitance of V3.	3K2039121.
C24	CAPACITOR, fixed: mica dielectric; 1000 μμf; 500 vdcw.	Blocks dc from primary of T6	3K3010221.
C8, C9	CAPACITOR, fixed: paper dielectric; 50,000 μμf; 600 vdcw.	C8—Blocks d-c voltage from handset C9—Establishes timing of pulse generated by E2.	3DA50–259.
C25	CAPACITOR, fixed: paper dielectric; 100,000 μμf; 600 vdcw.	Controls frequency of CONSTANT tone.	3DA100–730.
C14, C15, C16, C17	CAPACITOR, fixed: paper dielectric; 4 μf; 600 vdcw	C14, C15, and C17—Filter power output of V10. C16—Decoupling capacitor.	3DB4–279.
C22, C23	CAPACITOR, fixed: electrolytic; 550 μf; 15 vdcw	Reduce output ripple of CR1	3DB550–1.
	CASE CY–38/TIQ–2: 22″ lg x 16 3/16″ wd x 10⅛″ h	Holds control unit	2Z1891–38.
J1	CONNECTOR, receptacle: 3 rd female cont; pol; straight type.	Output termination of control unit	2Z3064–16.
P15	CONNECTOR, receptacle: 8 rd male cont; pol; straight type.	Power connector to unit	2E7118.22.
J26	CONNECTOR, receptacle: 10 flat male cont; pol; straight type.	Receives handset plug	2Z7250–79.
	COVER, terminal board: steel; 7⅜″ lg x 7¼″ wd x 1¼″ d.	Covers terminal posts	2Z3352.62.
V11	ELECTRON TUBE: VR105	Regulates voltage of E1 and E2	2JOC3.

3. Public Address Set Control C–1090/TIQ–3—Continued

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
V10	ELECTRON TUBE: 5U4G	Provides plate voltage for control unit	2J5U4G.
V3	ELECTRON TUBE: 6SL7GT	Amplifies voltage from T2	2J6SL7GT.
E6	FUSEHOLDER: extractor post type; 2½″ lg x 11/16″ dia.	Holder for F2	3Z3275–1.
F2	FUSE FU–26: 1 amp, 250 v; 1¼″ lg x 7/32″ dia	Protects unit against overload	3Z1926.
E8, E9	KNOB: rd with fluted edge; black bakelite; for ¼″ shaft.	E8—Adjusts R50 E9—Adjusts R51.	2ZK5822–32.
E1, E2	LAMP, glow: ¼″ w, 65 v ac, 90 v d-c striking	Local oscillators for tone signals	2Z5889–3.
E3	LAMP LM–27: 6–8 v, ¼ amp; miniature bayonet base.	ON-OFF indicating lamp	2Z5927.
J20, J21	LAMPHOLDER: for bayonet base type bulb; 1 9/16″ lg x 1″ wd x 1⅛″ h.	J20—Holds E1 J21—Holds E2.	2Z5885–18.
J22	LIGHT, indicator: with lens; for miniature bayonet base lamp; 2″ lg x .828″ dia.	Holds E3	2Z5991–17.
LS13	LOUDSPEAKER, dynamic: 4″ dia cone; PM; 4″ sq x 2 7/16″ d.	Monitor speaker	6C43–62.
H104, H105, H106, H107, H108, H109, H110, H111, H112, H113, H114, H115, H116, H117, H118, H119, H120.	POST, binding: screw type; 1 5/32″ h x 19/32″ dia	H104 through H115—Output terminal binding posts. H116 through H118—Common ground-return connections for output cables. H119 and H120—Input terminal leads from amplifier.	3Z737–19.
V3, V11	POST, supporting: 3¼″ lg x .164″ dia	Support tube clamps	2Z7259–85.
V10	POST, supporting: 4½″ lg x .164″ dia	Same as V3 and V11	2Z7259–86.
CR1	RECTIFIER, metallic: selenium; input 9 v ac, 60 cyc; output 6 v dc at .35 amp.	Provides dc for microphone and relay	3H4857–4.
K1	RELAY, armature: 4PDT; 50 v dc with 3 amp cont	Talk-back switching relay	2Z7597–3.

R42	RESISTOR, fixed: WW; 16 ohms; 12 w	Dummy load to replace LS13	3RW13501.
R45	RESISTOR, fixed: WW; 50 ohms; 30 w	Limits output of amplifier in listen position.	3RW16555.
R37, R38, R39	RESISTOR, fixed: composition; 1 meg; ½ w	R37—Times pulse generated by E1 R38—Limits d-c voltage to E1. R39—Limits d-c voltage to E2.	3RC20BF150K.
R31	RESISTOR, fixed: composition; 2 meg; ½ w	Times pulse generated by E2	3RC20BF205J.
R50, R51	RESISTOR, variable: WW; 50 ohms; 2 w	R50—Controls microphone input to T2 R51—Controls talk-back speaker output to T2.	3RA3006.
R48, R49	RESISTOR, variable: composition; 100,000 ohms; ½ w.	R48—Varies d-c input and frequency of E1. R49—Varies d-c input and frequency of E2.	3RV51009.
V3	RETAINER, electron tube: $2\frac{1}{32}''$ lg x $1\frac{7}{16}''$ wd x $\frac{23}{32}''$ d.	Retains tube	2Z1619–79.
V11	RETAINER, electron tube: $2\frac{5}{16}''$ lg x $1\frac{13}{16}''$ wd x $1\frac{1}{16}''$ d.	Same as V3	2Z7780–117.
V10	RETAINER, electron tube: $2\frac{9}{16}''$ lg x $2\frac{1}{8}''$ wd x $\frac{3}{4}''$ d.	Same as V3	2Z2643.138.
R3	RESISTOR, fixed: composition; 100 ohms; ½ w	Stabilizes output of CR1 in microphone circuit.	3RC20BF101K.
R46	RESISTOR, fixed: WW; 500 ohms; 10 w	Provides a minimum load for amplifier output.	3RW22507.
R7	RESISTOR, fixed: composition; 1,500 ohms; ½ w	Cathode resistor for V3	3RC20BF152K.
R43, R44	RESISTOR, fixed: composition; 10,000 ohms; 2 w	Filter network resistors	3RC42BE103K.
R24, R25, R26	RESISTOR, fixed: composition; 15,000 ohms; ½ w	R24 and R25—Limit minimum voltage to E1. R26—Decouples plate circuit of V10.	3RC20BF153K.
R41	RESISTOR, fixed: composition; 15,000 ohms; 2 w	Limits current through V11	3RC42BE153K.
R36	RESISTOR, fixed: composition; 51,000 ohms; ½ w	Limits discharge current of C25	3RC20BF513J.

3. Public Address Set Control C–1090/TIQ–3—Continued

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
R16, R17	RESISTOR, fixed: composition; 100,000 ohms; ½ w	R16—Grid resistor for V3 R17—Voltage-regulating resistor for plates of V3.	3RC20BF104K.
R40	RESISTOR, fixed: composition; 200,000 ohms; ½ w	Establishes timing of modulation pulse to E2.	3RC20BF204J.
X3, X10, X11	SOCKET, electron tube: medium octal	X3—Receives tube V3 X10—Receives tube V10. X11—Receives tube V11.	2Z8678.327.
S2	SWITCH, toggle: DPST	Operates CONSTANT tone generator	3Z8963–52K.1.
S4	SWITCH, toggle: DPDT	Determines operating voltage of set	3Z9863–52N.1.
S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18.	SWITCH, toggle: SPDT	S5 through S16—Operate individual loudspeakers. S17—Operates all loudspeakers. S18—Operates monitor speaker.	3Z9863–42D.1.
S19, S21	SWITCH, toggle: SPST	S19—Power ON-OFF switch S21—Talk-back operation control.	3Z9863–42H.
S20	SWITCH, toggle: TPDT	Operates CONSTANT-WARBLE generator.	3Z9858–34.1.
T2	TRANSFORMER, audio frequency: input type; pri 100 ohms, secd 25,000 ohms impedance; HS metal case.	Couples the audio input to the grids of V3.	2Z9631.203.
T6	TRANSFORMER, audio frequency: plate coupling type; pri 25,000 ohms, secd 100 ohms impedance; metal case.	Couples output plate of V3 to line	2Z9632.274.

T7	TRANSFORMER, power, step-down, step-up: filament and plate type; input 115 v, 50/60 cyc; output secd No. 1, 600 v ct at 9 ma; secd No. 2, 5 v at 3 amp; secd No. 3, 6.3 v at 1 amp; HS metal case.	Provides filament and plate voltages for control unit.	2Z9608–38.

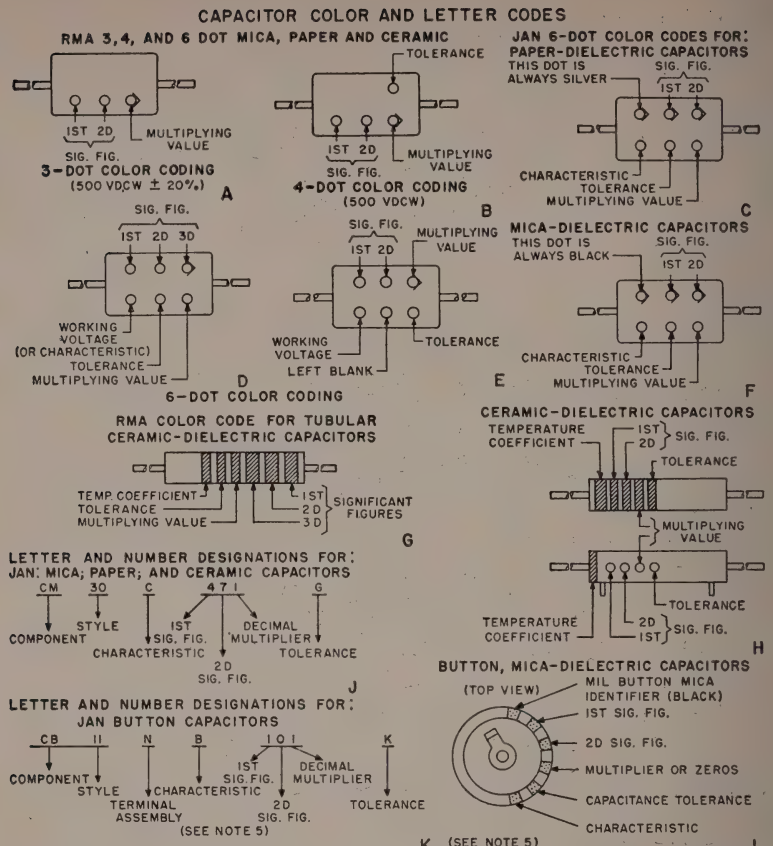
4. Loudspeaker LS–104/TIQ–3

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
	LOUDSPEAKER STAND MT–128A/TIQ–2: adjustable tripod type.	Provides mounting for loudspeaker	6C83–128A.
	SPEAKER DRIVER MX–1054/U: diaphragm type.	Converts electrical energy to mechanical energy.	6C17A–1054.
H44, H45, H46, H47, H48.	POST, binding: screw type	Provides means for connecting wires to speaker.	3Z737–19.
T8	TRANSFORMER, audio frequency: impedance-matching type.	Matches voice coil impedance	2Z9637.42.

5. Miscellaneous Equipment

Reference symbol	Name of part and description	Function of part	Signal Corps stock No.
	CABLE, special purpose: electrical; Cordage CO–218; 25′.	For cable assembly W10	3E2218.
	CABLE, special purpose: electrical; Special Purpose Cable WS–23/U; 52′.	For cable assemblies W3, W8, and W9	1B825.1.
	CABLE, power: electrical; Cordage CO–144; 100′	For cable assemblies W1, W2, W4 through W7.	3E2144.
W1, W2	CABLE ASSEMBLY, power: electrical; Cord CX–49/TIQ–2.	Power extension cord	3E6000–49.
W4	CABLE ASSEMBLY, power: electrical; Cord CX–53/TIQ–2.	Same as W1 and W2	3E6000–53.
W5, W6	CABLE ASSEMBLY, power: electrical; Cord CX–54/TIQ–2.	Same as W1 and W2	3E6000–54–300.
W7	CABLE ASSEMBLY, power: electrical; Cord CX–55/TIQ–2.	Same as W1 and W2	3E6000–55.
W3	CABLE ASSEMBLY, special purpose: electrical; CX–1931/U.	Audio-power extension cable	3E5999–6.29.
W8, W9	CABLE ASSEMBLY, special purpose: electrical; CX–1833/U.	Same as W3	3E5999–6.30.
W10	CABLE ASSEMBLY, special purpose: electrical; CX–1815/U.	Handset extension cord	3E5999–6.31.
	CABLE CLAMP M–293: for ⅞″ dia cable	Clamps cable	2Z2636–3.
	CHEST CY–96A/TIQ–3: 27″ lg x 17″ wd x 21″ h	Contains loudspeakers and Electrical Special Purpose Case CY–1048/U.	6C13–96.
	CASE, accessories: Electrical Special Purpose Case CY–1048/U; 15″ lg x 12″ wd x 8″ h.	Contains spare parts	6F300–1048.
	CLAMP, electrical: for ⅜″ dia cable	For Electrical Special Purpose Cable Assemblies CX–1931/U and CX–1833/U.	2Z2636–4.

	CONDUIT FITTING: 7/8" h x 29/32" dia	Same as above	2Z307–18.
J16, J17	CONNECTOR, plug: 2 twist-lock female cont; pol; straight type.	J16—Cable terminal for W7 J17—Cable terminal for W6. J18—Cable terminal for W5.	6Z3149.
P9, P10, P11, P12, P13.	CONNECTOR, plug: 2 twist-lock male cont; straight type.	P9—Cable terminal for W2 P10—Cable terminal for W1. P11—Cable terminal for W6. P12—Cable terminal for W5. P13—Cable terminal for W4.	6Z1735.4.
P16	CONNECTOR, plug: 2 flat male cont; straight type	Cable terminal for W7	6Z1727.
J6, J25	CONNECTOR, plug: 3 rd female cont; pol; straight type.	J6—Cable terminal for W8 J25—Cable terminal for W9.	2Z3023–54.
J7	CONNECTOR, plug: 3 rd female cont; pol; straight type.	Cable terminal for W3	2Z3064–9.
P6, P7, P8	CONNECTOR, plug: 3 rd male cont; pol; straight type.	P6—Cable terminal for W8 P7—Cable terminal for W3. P8—Cable terminal for W9.	2Z7113.35.
J10, J11	CONNECTOR, plug: 8 rd female cont; pol; straight type.	J10—Cable terminal for W1 J11—Cable terminal for W2.	2Z3069–6.
J24	CONNECTOR, plug: Plug Connector U–79/U; 10 male cont; pol; straight type.	Junction box	2Z3071–27.
P17	CONNECTOR, plug: 10 rd male cont; pol; straight type.	Cable terminal for W10	2Z3030–30.
J12, J13, J14, J15	CONNECTOR, receptacle: 2 twist-lock female cont; pol; straight type.	Junction box for power cords	6Z7808.
H44	FASTENER, latch: for Chests CY–96A/TIQ–3 and CY–38/TIQ–2.	Secures cover of chests	6Z1747–25.1.
	HANDSET H–33D/PT: 300-ohm receiver impedance and 60-ohm transmitter impedance.	The microphone converts the voice into electrical energy and the receiver converts audio power into audible sound.	2B620–33.



- STANDARDS -					JAN MICA-CM		JAN PAPER-CM		JAN CERAMIC-CC					
									CAP. TOL. FOR MORE THAN 10 UUF			CAP. TOL. FOR 10 UUF OR LESS		
COLOR	SIG. FIG.	DECIMAL MULTIPLIER	% TOL.	VDCW	LETTER TOL.	CHARAC-TERISTIC	LETTER TOL.	CHARAC-TERISTIC	DEC. MULT.	%	LETTER DESIG-NATION	UUF	LETTER DESIG-NATION	CHARAC-TERISTIC
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	-	K	-	-	-	-	-	-	-
NO COLOR	-	-	±20	500	-	-	-	-	-	-	-	-	-	-
*. THE TOLERANCE OF THIS CAPACITOR IS ±30%, NOT ±3%														

NOTES

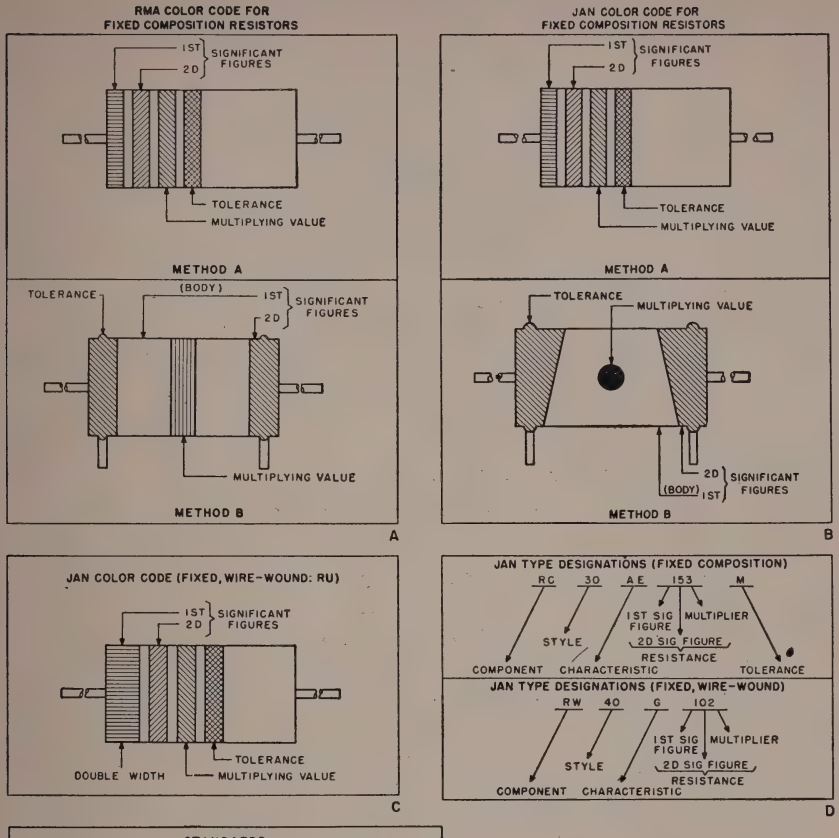
JAN: JOINT ARMY-NAVY
RMA: RADIO MANUFACTURERS ASSOCIATION

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:
   CB MICA BUTTON: *CC* CERAMIC; *CM* MICA MOULDED: *CN* PAPER MOULDED

TM CC

Figure 24. Capacitor color code.

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.

TMRC

Figure 25. Resistor color code.

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