TM 11-2566

WAR DEPARTMENT TECHNICAL MANUAL

PUBLIC ADDRESS SET

AN/PIQ-1

WAR DEPARTMENT *18 MAY 1945*

WAR DEPARTMENT TECHNICAL MANUAL

TM 11-2566

PUBLIC ADDRESS SET

AN/PIQ-1

WAR DEPARTMENT *18 MAY 1945*

WAR DEPARTMENT,
WASHINGTON 25, D. C., 18 MAY 1945.

TM 11-2566, Public Address Set AN/PIQ-1, is published for the information and guidance of all concerned.

[A. G. 300.7 (17 Jan 45).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:
J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

AAF (5); AGF (5); ASF (2); T of Opn (5); Dept (5); Def Comd (2); Base Comd (5); AAF Comd (2); Arm & Sv Bd (2); S Div ASF (1); Tech Sv (2); SvC (5); Area ASvC (2); WDGS Lib (5); PC&S (2); PE (2); Dep 11 (2); Gen Overseas SOS Dep (Sig Sec) (2); GH (2); M Conc C (2); Air Base Hosp (2); Gen Sv Sch (5); Sp Sv Sch (10); USMA (10); ROTC (5); Lab 11 (2); Sig AS (2); Rep Shop 11 (2); A (5); D (2); AF (2); T/O & E 5-466 (5); 5-467 (5); 11-107 (3); 11-127 (3); 11-237 (3); 11-537S (5); 11-587 (3); 11-592 (3); 11-597 (3).

(For explanation of symbols see FM 21-6.)

TABLE OF CONTENTS

★ ★

PART ONE. Introduction.

			Paragraph	*Page*
Section	I.	Description of Public Address Set AN/PIQ-1.		
		Description	1	1
		Application	2	1
		Technical characteristics	3	1
		Physical characteristics	4	3
		Table of components	5	4
		Packaging data	6	5
		Description of major components	7	5
	II.	Installation of Public Address Set AN/PIQ-1.		
		Siting	8	8
		Uncrating and checking	9	9
		Connections and interconnections	10	10
		Repacking information	11	15

PART TWO. Operating instructions.

Section	III.	Controls and their uses.		
		Amplifier control	12	16
		Microphone control	13	13
	IV.	Operation.		
		Starting procedure	14	17
		Operating procedure	15	17
		Stopping procedure	16	17
	V.	Equipment performance check list.		
		Purpose and use of check list	17	17
		Equipment performance check list	18	18

TABLE OF CONTENTS

PART THREE. Preventive maintenance.

			Paragraph	*Page*
Section	VI.	Preventive maintenance techniques.		
		Meaning of preventive maintenance	19	19
		Description of preventive maintenance techniques	20	19
		Vacuum tubes	21	21
		Capacitors	22	23
		Resistors	23	23
		Potentiometer	24	24
		Transformers	25	24
		Microphone	26	24
		Batteries	27	24
		Tripod	28	25
		Loudspeaker	29	25
		Cables	30	25
	VII.	Itemized preventive maintenance.		
		Introduction	31	26
		Common materials needed	32	26
		Preventive maintenance check list	33	26
	VIII.	Lubrication.		

PART FOUR. Auxiliary equipment.

Section	IX.	Auxiliary equipment used.		
		Power source	34	28
		Use with battery charger	35	29
		Using Public Address Set AN/PIQ-1 with auxiliary equipment	36	29

PART FIVE. Repair instructions.

Section	X.	Theory of equipment.		
		Microphone M-8	37	31
		Amplifier AM-74	38	32
		Transformer TF-102	39	33
		Loudspeaker LS-110	40	33

TABLE OF CONTENTS

PART FIVE. Repair instructions.

		Paragraph	*Page*
Section XI.	Trouble shooting.		
	General trouble-shooting information	41	34
	Test equipment required	42	35
	Inspection	43	35
	Sectionalization	44	35
	Trouble location checks	45	37
	Localization	46	37
	Voltage measurements	47	38
	Resistance measurements	48	41
	Capacitor tests	49	45
	Tube checking	50	46
	Operator's trouble-shooting chart	51	47
	Repairman's trouble-shooting chart	52	47
	Repairman's trouble-shooting chart (tube troubles)	53	48
XII.	Repairs.		
	Replacement of parts	54	48
	Replacement procedures	55	49
	Unsatisfactory Equipment Report	56	49

APPENDIX.

Section XIII.	References.		
	Parts list	57	51
	Test equipment	58	51
	Decontamination	59	51
	Demolition	60	51
	Camouflage	61	51
	Other technical publications	62	51
	Form	63	51
XIV.	Maintenance parts.		
	Maintenance parts for Public Address Set AN/PIQ-1	64	52

LIST OF ILLUSTRATIONS

Fig. No.	*Title*	*Page*
1	Public Address Set AN/PIQ-1	VIII
2	Components of Public Address Set AN/PIQ-1	2
3	Battery Tray MT-352 with one battery removed	3
4	Spare Parts	8
5	Diagram for unpacking procedure	9
6	Public Address Set AN/PIQ-1 as portable equipment	10
7	Public Address Set AN/PIQ-1 used with Tripod MT-353	12
8	Public Address Set AN/PIQ-1 connected to use external power	13
9	Public Address Set AN/PIQ-1 using Microphone T-17	14
10	Components stored in carrying case, cords removed	15
11	Controls	16
12	Top and bottom view of Amplifier AM-74	22
13	Public Address Set AN/PIQ-1 used with Chest Set TD-4	28
14	Public Address Set AN/PIQ-1 used with Cord CD-318-A	29
15	Public Address Set AN/PIQ-1 with auxiliary loud-speaker mounted in rear on jeep	30
16	Public Address Set AN/PIQ-1 with auxiliary loud-speaker mounted on hood of jeep	30
17	Over-all block diagram and block diagram of amplifier stage	32
18	Schematic diagram	36
19	Voltage and resistance chart	40
20	Cords wiring diagram	42
21	Resistor color code	44
22	Unsatisfactory Equipment Report with sample entries	50

DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut —Use axes, handaxes, machetes.

3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—Amplifier, all tubes, vibrator, microphone, loudspeaker, transformers, cases, tripod, etc.

2. Cut —All wires, cords, etc.

3. Burn —Pile up and burn all cases, tripod, amplifier, microphone, speaker, cords, and technical manuals.

4. Bend —Tripod, cases.

5. Bury or scatter—Any or all of the above pieces after destroying their usefulness.

DESTROY EVERYTHING

Figure 1. Public Address Set AN/PIQ-1.

PART ONE
INTRODUCTION

SECTION I
DESCRIPTION OF PUBLIC ADDRESS SET AN/PIQ-1

1. DESCRIPTION.

Public Address Set AN/PIQ-1 (fig. 1) is a portable electro-acoustic system consisting of an Amplifier AM-74, Battery Tray MT-352, Loudspeaker LS-110, Microphone M-8, and other accessories to give a wide variation in its use. The system is portable and permits rapid assembly with maximum safety to personnel in its installation, operation, adjustment, and maintenance. All parts of the equipment are tropicalized and are corrosion-resistant.

2. APPLICATION.

Public Address Set AN/PIQ-1 is used to address small groups of personnel under training and tactical conditions.

3. TECHNICAL CHARACTERISTICS.

a. Power Input. Power required for Public Address Set AN/PIQ-1 is obtained from three storage Batteries BB-206/U with a total 6-volt, d-c output, which are carried in the lower half of Case CY-314. A cord, terminated with battery clips and a connector, is provided so an external 6-volt, d-c power supply may be used.

b. Current Requirements and Power Input.

Condition	Power input (watts)	Current requirements (amperes)
Standby	0	0
Operating MICROPHONE M-8 switch on but no signal input	9.6	1.6
Operating (at rated output) Operating (at peak output)	13.2	2.2

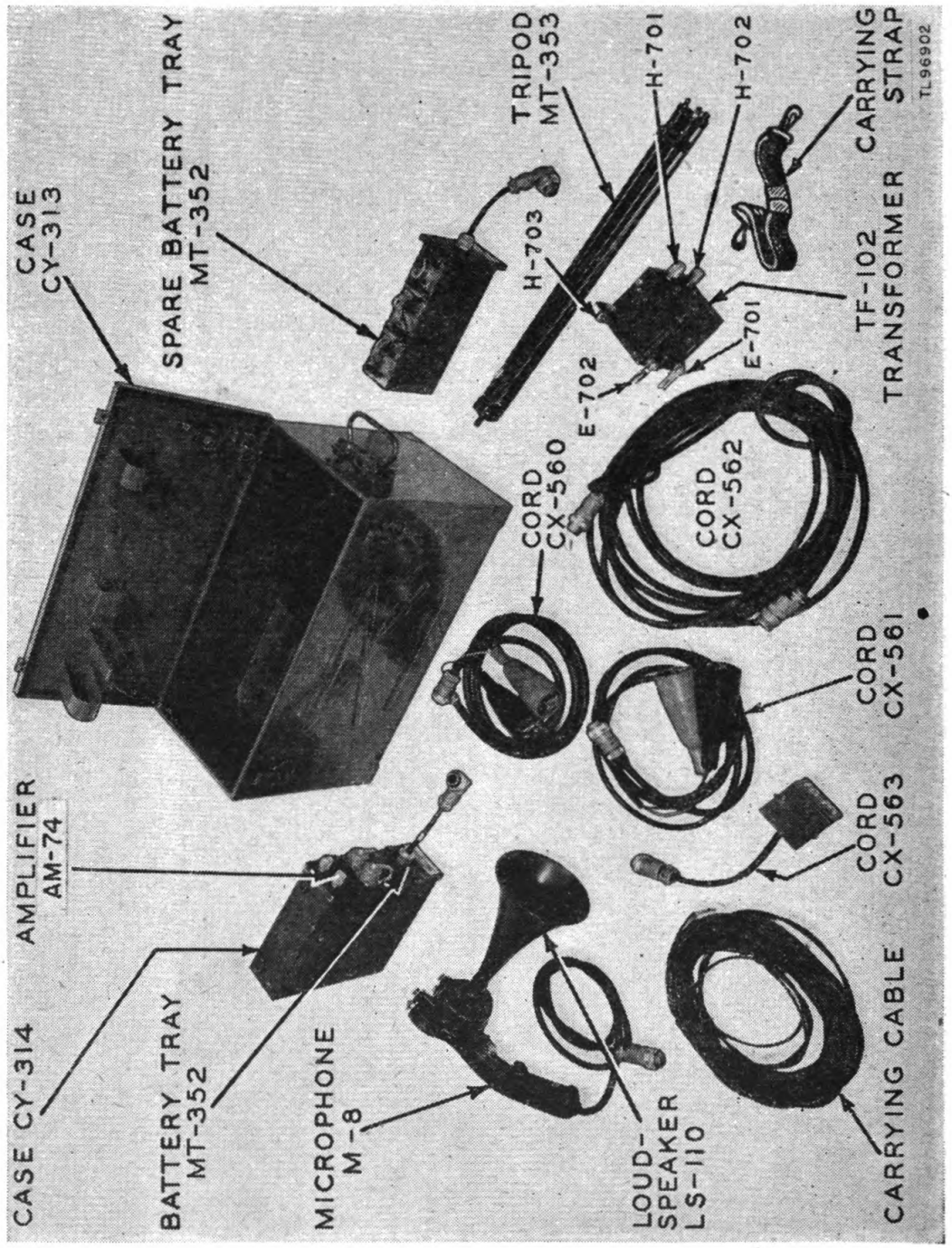


Figure 2. Components of Public Address Set AN/PIQ-1.

c. Power Output. Amplifier AM-74 is carried in the upper half of Case CY-314 and has a maximum output of 1½ watts with not more than 10 percent total harmonic distortion when measured at 1,000 cycles.

d. Frequency Response. The frequency response does not vary more than plus or minus 2½ decibels from the 1,000-cycle value over a range of 250 to 5,000 cycles. Frequency response decreases at least 3 decibels per octave below 250 cycles and this decrease is free from peaks.

e. Power Gain. The amplifier has a power gain at 1,000 cps of at least 35 decibels with suitable volume control varying the power gain.

f. Communication Range. The range of Public Address Set AN/PIQ-1 is 600 feet with 100 percent intelligibility.

4. PHYSICAL CHARACTERISTICS.

Carrying Case CY-313, containing Public Address Set AN/PIQ-1 and running spare parts, weighs approximately 40 pounds. The carrying case is 20¼ inches long, 9½ inches high, 9⅛ inches wide, and may be easily carried by one man, if necessary. Sheet

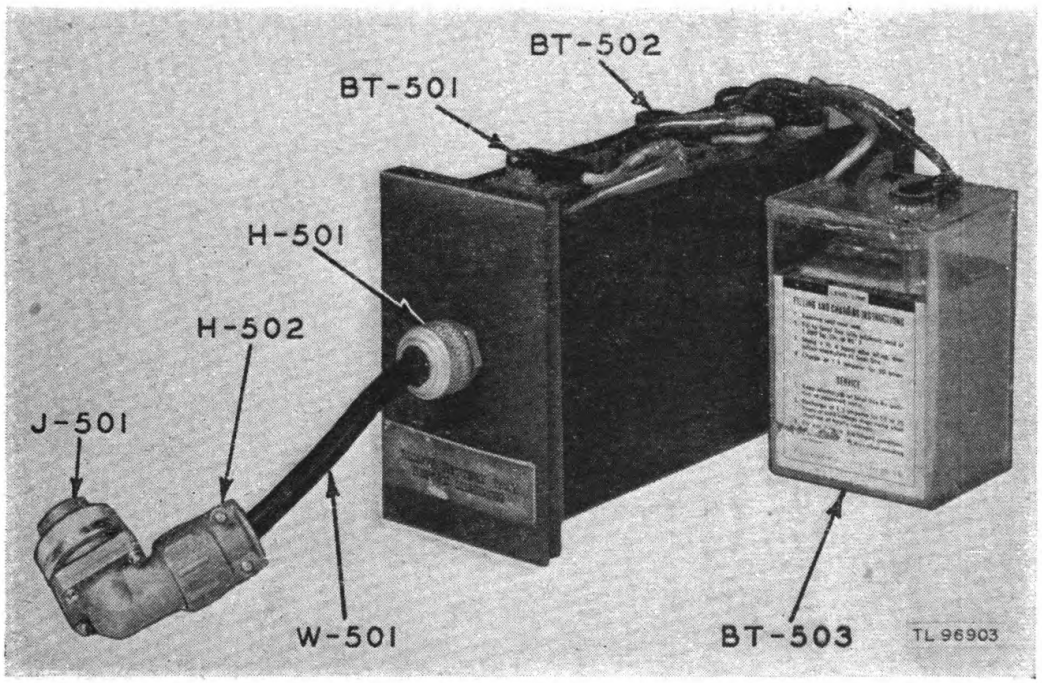


Figure 3. Battery Tray MT-352 with one battery removed.

steel is used for the construction of the carrying case, with projections and partitions welded inside the cover and the bottom to hold all parts securely in place when the cover of the carrying case is closed. A rubber gasket in the cover of the carrying case keeps out dirt and moisture when the cover is closed and secured with the trunk-type fasteners.

5. TABLE OF COMPONENTS.

Component	Number required	Height (in.)	Depth (in.)	Length (in.)	Dia. (in.)	Weight (lb)
Box (packed)	1	13½	13½	24½		70.0
Operating parts						
Case CY-313/PIQ-1	1	9½	9⅛	20¼		15 0
Amplifier AM-74/PIQ-1	1	4⅜	9¾	2¾		3.4
Battery Tray MT-352/PIQ-1	1	4⅜	14½	2¾		5.0
Case CY-314/PIQ-1	1	8⅜	8¼	2½		3.25
Loudspeaker LS-110/PIQ-1	1			10¾	5	1.75
Microphone M-8/PIQ-1	1	3⅛	3½	62		0.90
Tripod MT-353/PIQ-1	1	18 to 55			1⅝	2.25
Transformer TF-102/PIQ-1	1	4¾	5¼	3⅝		2.0
Carrying Strap	3		2	28 to 48		0.5
Cord CX-560/PIQ-1	1			120		1.5
Cord CX-561/PIQ-1	1			120		1.4
Cord CX-562/PIQ-1	1			300		2.0
Cord CX-563/PIQ-1	1	1½	2¼	9		0.5
Wire W-110-B	1			300		0.75
Running spares						
Battery Tray MT-352/PIQ-1	1	4⅜	14½	2¾	¾	5.0
Tube JAN-3A5	1	2⅛			¾	0.1
Vibrator	1	2			1⅛	0.2

NOTE: For ease in reference to the components of Public Address Set AN/PIQ-1, the suffix nomenclature PIQ-1 has been dropped in this technical manual. For example, reference to Amplifier AM-74/PIQ-1 will be Amplifier AM-74.

6. PACKAGING DATA.

All components of Public Address Set AN/PIQ-1 and running spare parts are enclosed in one wooden shipping box. The contents, dimensions, and weights of the box and major components are listed in paragraph 5.

7. DESCRIPTION OF MAJOR COMPONENTS (fig. 2).

a. Amplifier AM-74. Component parts of Amplifier AM-74 are mounted on a chassis which slides into Case CY-314 and is held in place by two trunk-type fasteners on the front. Upon removal from the case all components are visible and are easily accessible for maintenance and repair.

b. Front Panel of Amplifier AM-74. On the front panel two terminal binding posts are located near the top, two connectors near the bottom, and a VOLUME control knob is placed in the middle. The binding post terminals are used to connect Amplifier AM-74 to Transformer TF-102 by means of a connecting cable when the equipment is assembled using Tripod MT-353 (fig. 7). By turning the VOLUME control knob clockwise the volume is increased and turning it in the opposite direction will decrease the volume. Power is supplied through the connector near the bottom of the right side of the front panel either from the Battery Tray MT-352 or from an external 6-volt, d-c source. Microphone M-8 is connected to the other connector near the bottom on the left side of the front panel. Caps for the two connectors are chained to the front panel and should be screwed on the connectors when not in use.

c. Loudspeaker LS-110. This loudspeaker is a two-piece blastproof metal, dwarf type, with two binding post terminals to fit directly on Microphone M-8. These binding post terminals also connect to Transformer TF-102 when it is mounted on Tripod MT-353. An additional slotted bracket is located on the underside of the loudspeaker to help hold it firmly when it is attached to the thumbscrew on the microphone or transformer.

d. Microphone M-8. This consists of a connector attached to 4 feet of four-conductor, rubber-insulated, cordage which is fastened

to a plastic microphone handle. A push-button switch is located near the middle of the handle and a lip microphone is fastened at the end of the plastic handle. Two slotted terminal lugs are molded in the plastic handle at the end near the lip microphone to hold and make contact with Loudspeaker LS-110 when the Public Address Set AN/PIQ-1 is used as a portable system.

e. Battery Tray MT-352 (fig. 3). Three Batteries BB-206/U, connected in series, are mounted in the steel chassis tray. A cord 3½ inches long with a connector on one end and connected to the battery terminals on the other end protrudes from the front of Battery Tray MT-352. The batteries are shipped dry-charged and electrolyte must be added before use according to instructions on the batteries.

f. Tripod MT-353. When telescoped to its smallest size the steel legs of Tripod MT-353 reduce to about 18 inches in length but they may be extended to 55 inches. A threaded steel rod (⅜-16) protrudes from the top of the Tripod MT-353 for mounting Transformer TF-102 and giving additional height. By turning the rod the transformer is screwed to the tripod. When the wing screw on the rod is tightened, the transformer is locked securely in place.

g. Transformer TF-102. This is a metal box with a ⅜-16 tapped hole, two binding posts, two slotted terminal lugs, and with a transformer mounted inside. The tapped hole is in the center of the bottom panel so the threaded rod on Tripod MT-353 may be fastened through it. Two slotted terminal lugs are mounted on the top for making electrical contact and mounting to Loudspeaker LS-110. Two terminal binding posts are on the opposite side for connecting Transformer TF-102 to Amplifier AM-74 with the 25 feet of connecting Wire W-110-B.

h. Case CY-314. Twenty gauge steel is used in the construction of Case CY-314 and all seams are welded. Two rings are mounted on the top of the case and two on the sides to secure the carrying straps. The case is divided into two compartments to accommodate Amplifier AM-74 in the top half and Battery Tray MT-352 in the lower half. Four trunk-type fasteners are welded on the sides of the case to hold the amplifier and battery tray firmly in place.

i. Case CY-313. Carrying Case CY-313 carries all the parts of Public Address Set AN/PIQ-1 and a spare Battery Tray MT-352, Tube JAN-3A5 and vibrator.

j. Carrying Straps. A strap consists of 2-inch webbing with a snap hook on each end. By means of a sliding buckle the strap may be adjusted from 28 to 48 inches. Three straps are furnished; one to shoulder-carry Case CY-314, another to go around the waist to hold the case firmly against the operator's side, and the third to loop around the operator's neck to hold Microphone M-8 when not in use.

k. Cords and Cables (fig. 2). Four cords and one cable (25 feet of Wire W-110-B) are provided and are carried in Case CY-313. All cords are covered with a rubber jacket to make them water-resistant, give longer life, and to resist abrasion.

(1) Cord CX-560. This cord is made of 10 feet of two-conductor Cordage CO-144 with a connector on one end and two rubber-covered battery clips on the other end. Battery Tray MT-352 may be connected to a battery charger by using this cord.

(2) Cord CX-561. This cord is composed of 10 feet of two-conductor Cordage CO-144 with a connector on one end and two rubber-covered battery clips on the other end. By using this cord an outside source of 6-volt, d-c power may be conducted to Amplifier AM-74.

(3) Cord CX-562. This cord is 25 feet in length, with four No. 18 AWG wire conductors covered with braided shielding and a rubber jacket. It is equipped on both ends with combination connectors and cable clamps, and may be used to extend the connection between Amplifier AM-74 and Microphone M-8, or when used with Cord CX-563, extends the connection between the amplifier and any suitable carbon microphone (Microphone T-17 or T-45).

(4) Cord CX-563. This adapter cord is made with 6 inches of four-conductor No. 18 AWG wire, shielded, with rubber insulation. One end is terminated by a connector and at the other end is a metal junction box. This junction box is 1⅜ inches by 2 inches

by 2 inches and has two female connectors in it. By using this adapter cord, a carbon-type microphone and a 15-ohm voice-coil loudspeaker may be used with Public Address Set AN/PIQ-1.

(5) Connecting Cable. Twenty-five feet of Wire W-110-B, twisted pair, is furnished for an extension between Amplifier AM-74 and Transformer TF-102. The ends of the wire are stripped back 1 inch and tinned.

l. Running Spares. A Battery Tray MT-352, Tube JAN-3A5, and a vibrator are furnished as running spare parts. A small metal compartment with a hinged lid is welded in the bottom of the carrying Case CY-313 to hold the tube and vibrator. Another compartment is welded in the bottom of the case to hold the spare battery tray.

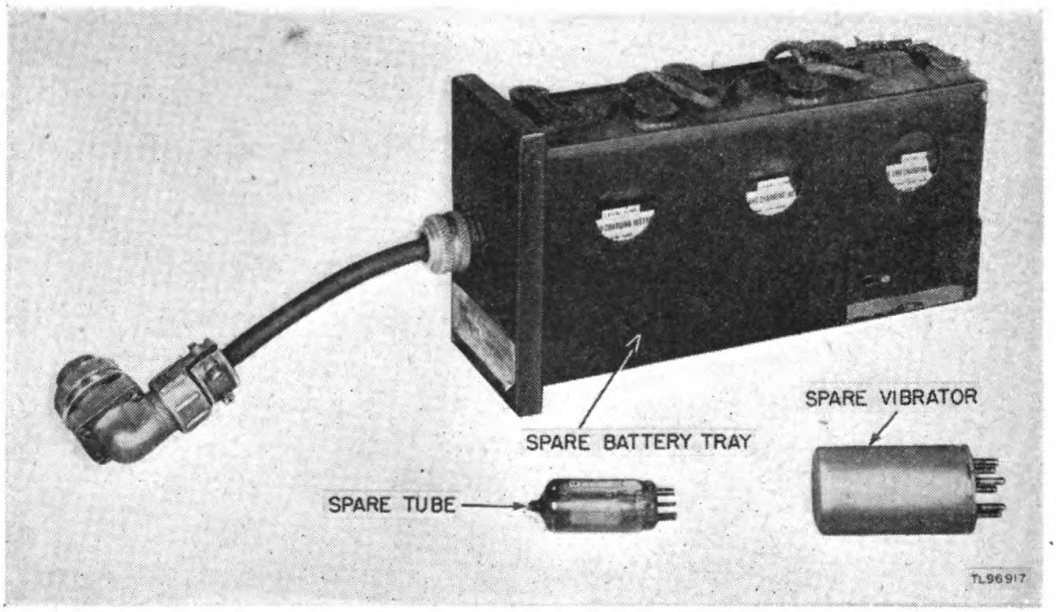


Figure 4. Spare parts.

SECTION II
INSTALLATION OF PUBLIC ADDRESS SET AN/PIQ-1

8. SITING.

By connecting the equipment as described in paragraph 10a, the set may be carried by the carrying straps and the operator is free to move about. If the system is used with Tripod MT-353 as

described in paragraph 10b, the tripod should be set so that Loudspeaker LS-110 will be level. The construction of Public Address Set AN/PIQ-1 will allow it to be used on very rugged terrain and under adverse conditions.

9. UNCRATING AND CHECKING.

Public Address Set AN/PIQ-1 is shipped inclosed in a wooden box. Open the box by following the step-by-step instructions below and shown on figure 5.

a. Open the box carefully with the proper tools. Steel strapping may be broken by prying up the band with a claw hammer, then cutting with tin snips.

b. Remove the lid by using a nail puller, claw hammer, or wrecking bar. Avoid any unnecessary hammering or the use of hooks, screwdrivers or similar tools.

c. Open the waterproof liner.

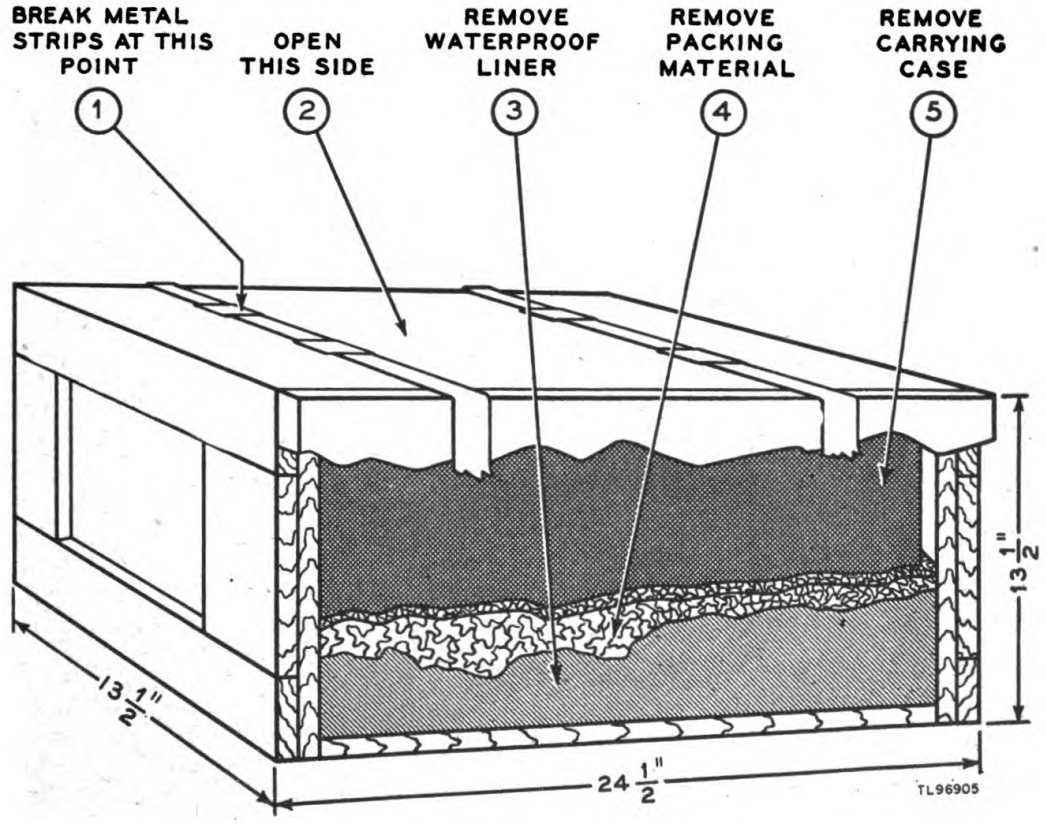


Figure 5. Diagram for unpacking procedure.

d. Remove the packing from the top of the carrying Case CY-313 and from the sides until the carrying case will easily pull out.

e. Lift the carrying case from the box and dust the case with a clean, dry cloth. Open the lid and remove any packing inside the carrying case.

f. Carefully inspect each component for shipping damage or for missing components and report damaged or missing components immediately.

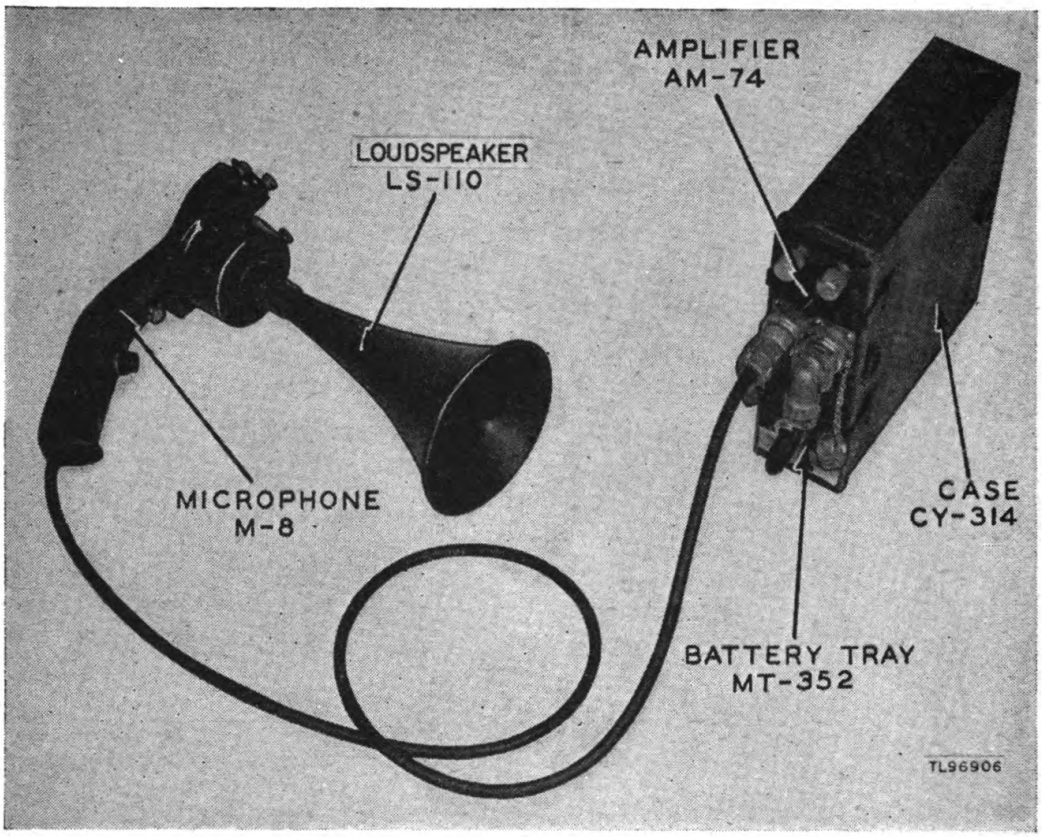


Figure 6. Public Address Set AN/PIQ-1 as portable equipment.

10. CONNECTIONS AND INTERCONNECTIONS.

Public Address Set AN/PIQ-1 may be connected in many different ways to meet local conditions. Cords and accessories are supplied to enable the operator to assemble the equipment for each particular job. Listed below are several ways of using the equipment.

a. Portable Use. For portable use make the following connections (fig. 6).

(1) Screw the two parts of Loudspeaker LS-110 together.

(2) Fasten the loudspeaker terminal thumbscrews to the slotted terminals on Microphone M-8.

(3) Tighten the thumbscrew on the microphone to hold the loudspeaker firmly in place.

(4) Check to see that Amplifier AM-74 is in the top of Case CY-314 and Battery Tray MT-352 is in the bottom of the case, and connect the battery tray cord to the amplifier. Check condition of batteries (par. 7e).

(5) Fasten the connector on Microphone M-8 to the connector on Amplifier AM-74.

(6) Clip the carrying strap into the rings on top of Case CY-314 and sling the strap over a shoulder. Put another strap about the waist and snap it to the rings on the side of the case to hold it snugly. The third strap should be clipped to the ring on Microphone M-8 and put around the neck.

(7) The equipment is now ready for operation.

b. Stationary Use. For use with the tripod proceed as follows (fig. 7):

(1) Remove Tripod MT-353 and extend the legs to the desired length.

(2) Place Transformer TF-102 in position on the tripod. Screw the rod on the tripod into the tapped hole on the bottom of the transformer.

(3) Adjust the rod to the desired height and lock the threaded rod in place with the wingscrew.

(4) Screw the two parts of Loudspeaker LS-110 together and fasten the terminal thumbscrews to the slotted terminals on Transformer TF-102.

(5) Remove the connecting cable (Wire W-110-B) from the carrying Case CY-313 and fasten one end to the thumbscrew terminals on Transformer TF-102.

(6) **Remove Case CY-314 from carrying Case CY-313 and connect Amplifier AM-74 to Battery Tray MT-352.**

(7) **Fasten the other ends of the connecting cable to the two thumbscrew terminals at the top of the front panel on Amplifier AM-74.**

(8) **Fasten the connector on Microphone M-8 to the connector on the front of Amplifier AM-74.**

(9) **The equipment is now ready for operation.**

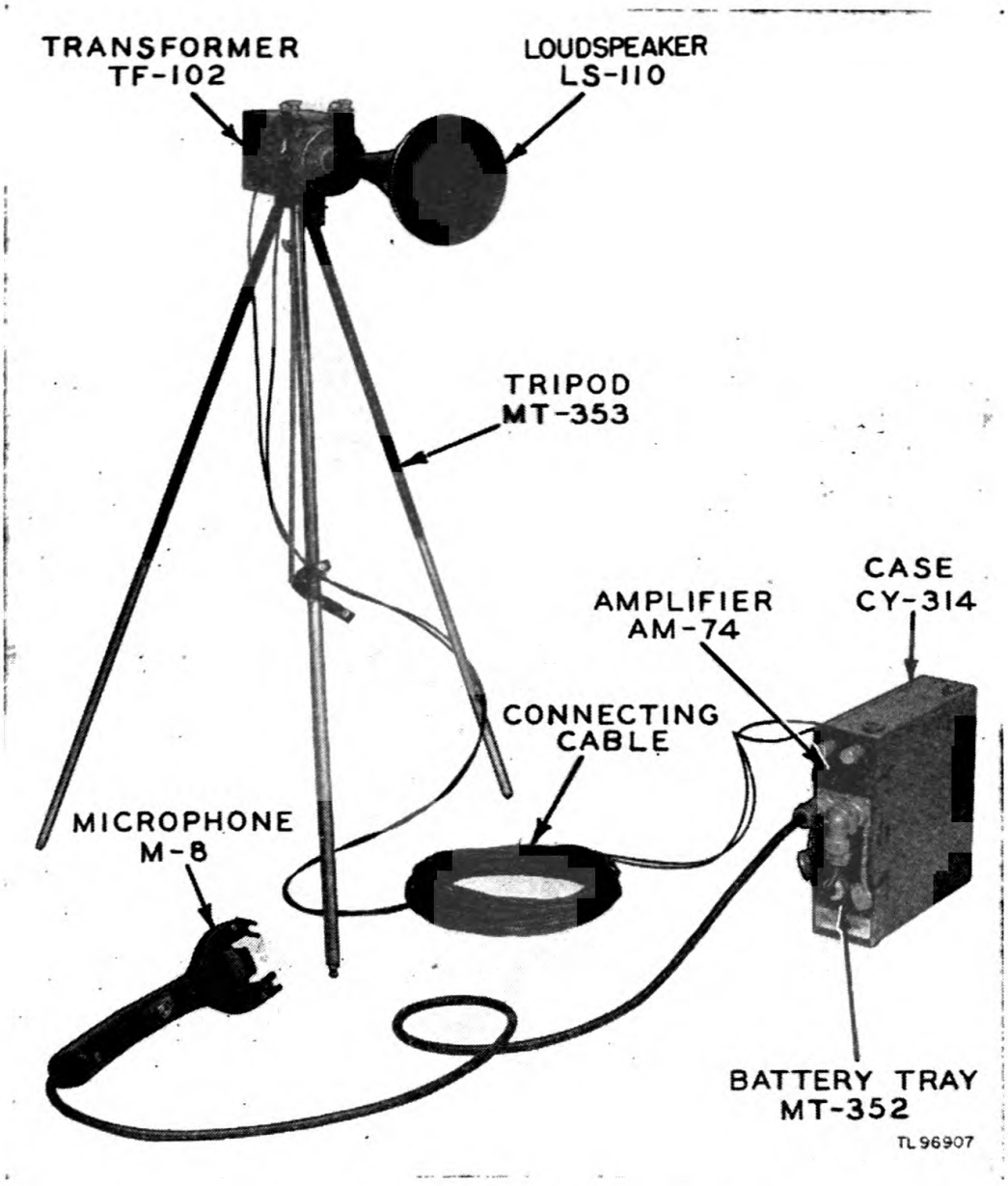


Figure 7. Public Address Set AN/PIQ-1 used with Tripod MT-353.

c. Other Connections. The two methods of connecting Public Address Set AN/PIQ-1 described in the previous subparagraphs are the fundamental positions. Methods of connecting the equipment for other conditions are as follows:

(1) Using Outside Power Source (fig. 8). If it is desirable to use an outside 6-volt, d-c source of power, connect the equipment in either of the two fundamental positions but attach Cord CX-561 to the connector on Amplifier AM-74 and fasten the battery clips to the terminals of the external power source.

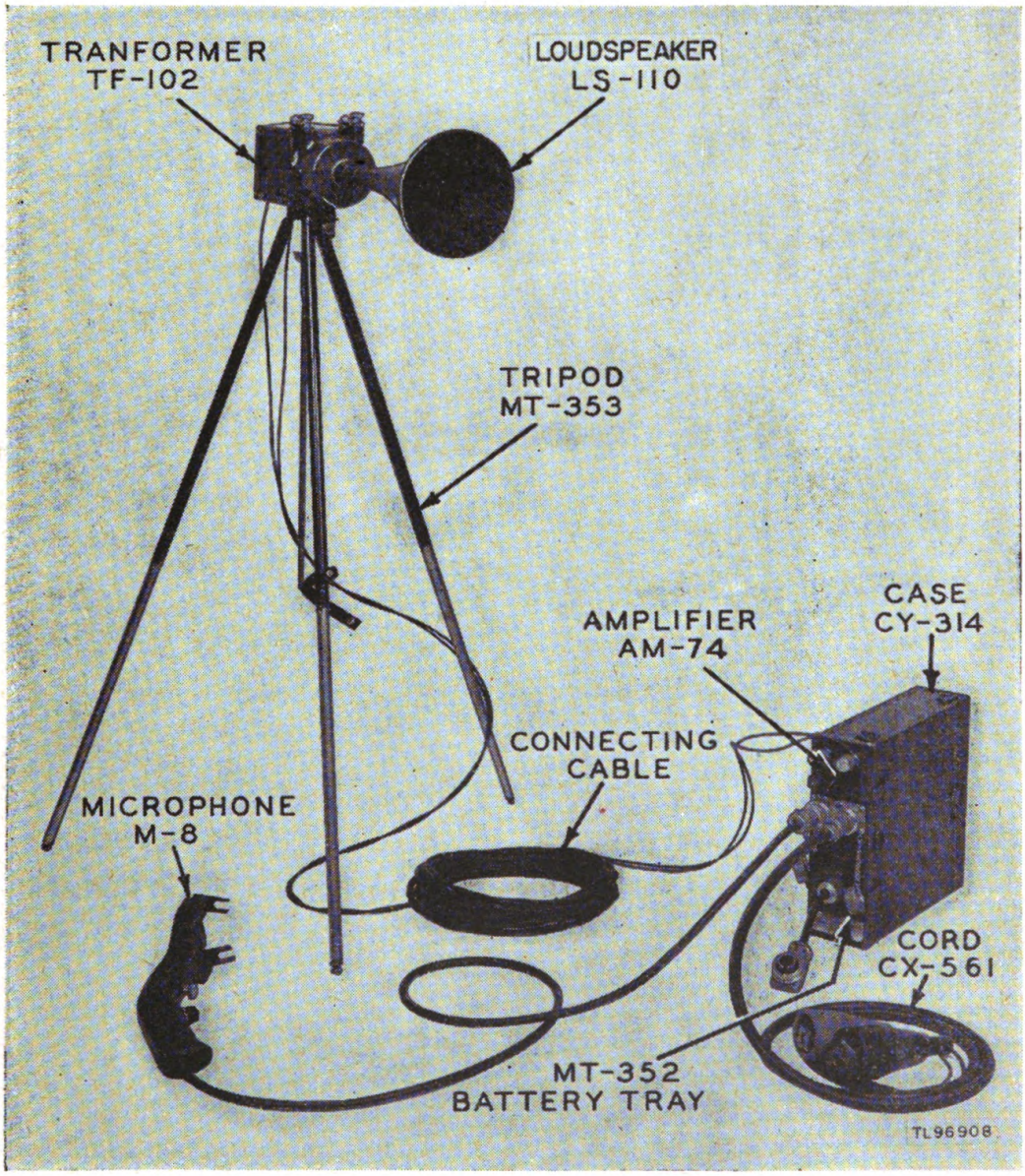


Figure 8. Public Address Set AN/PIQ-1 connected to use external power.

(2) Using A Carbon-type Microphone (fig. 9). A carbon-type microphone may be used if desired. Connect the set as described in paragraph 10b but fasten adapter Cord CX-563 to the connector on Amplifier AM-74. Plug the carbon microphone into the adapter box on Cord CX-563.

(3) Another 25-foot Cord CX-562 is supplied and can be used if the operator wishes to have an extension between the microphone and Amplifier AM-74.

(4) Each of the attachments may be used singly or in any combination desired. The operator should decide which connections and accessories will suit his needs the best and use that system.

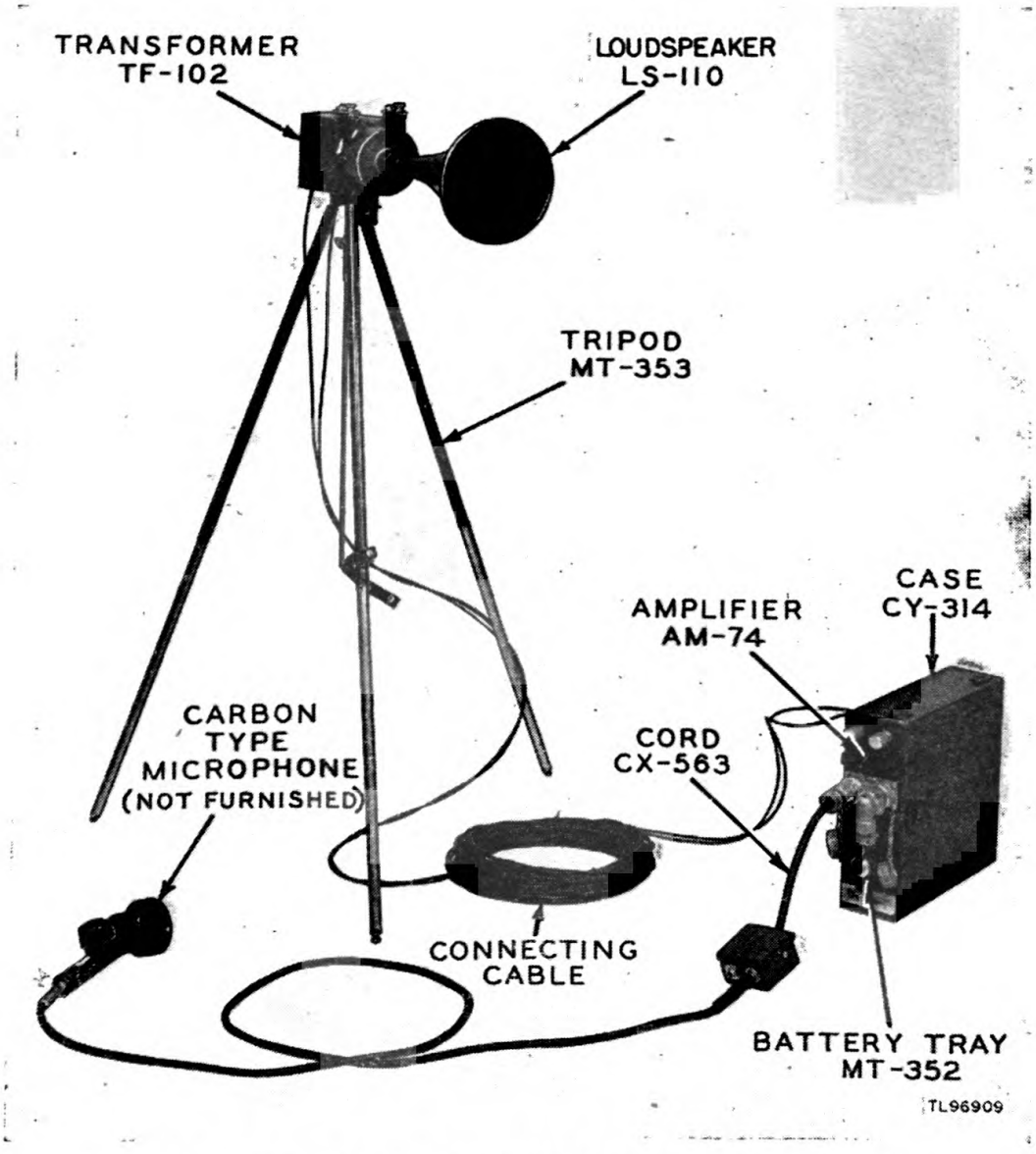


Figure 9. Public Address Set AN/PIQ-1 using Microphone T-17.

11. REPACKING INFORMATION.

To prepare Public Address Set AN/PIQ-1 for repacking, disconnect all interconnecting cables. Place all components in their proper position in carrying Case CY-313 as shown in figure 10. Coil the cable and cords in small loops and place them in the space provided in carrying Case CY-313. Be sure nothing is placed on top of the components in the case as the projections on the lid are designed to fit firmly against the components to hold them in place. Close the lid, fasten the snaps and the unit is ready for transportation. If necessary, the unit may be repacked in the wooden box as outlined in figure 5.

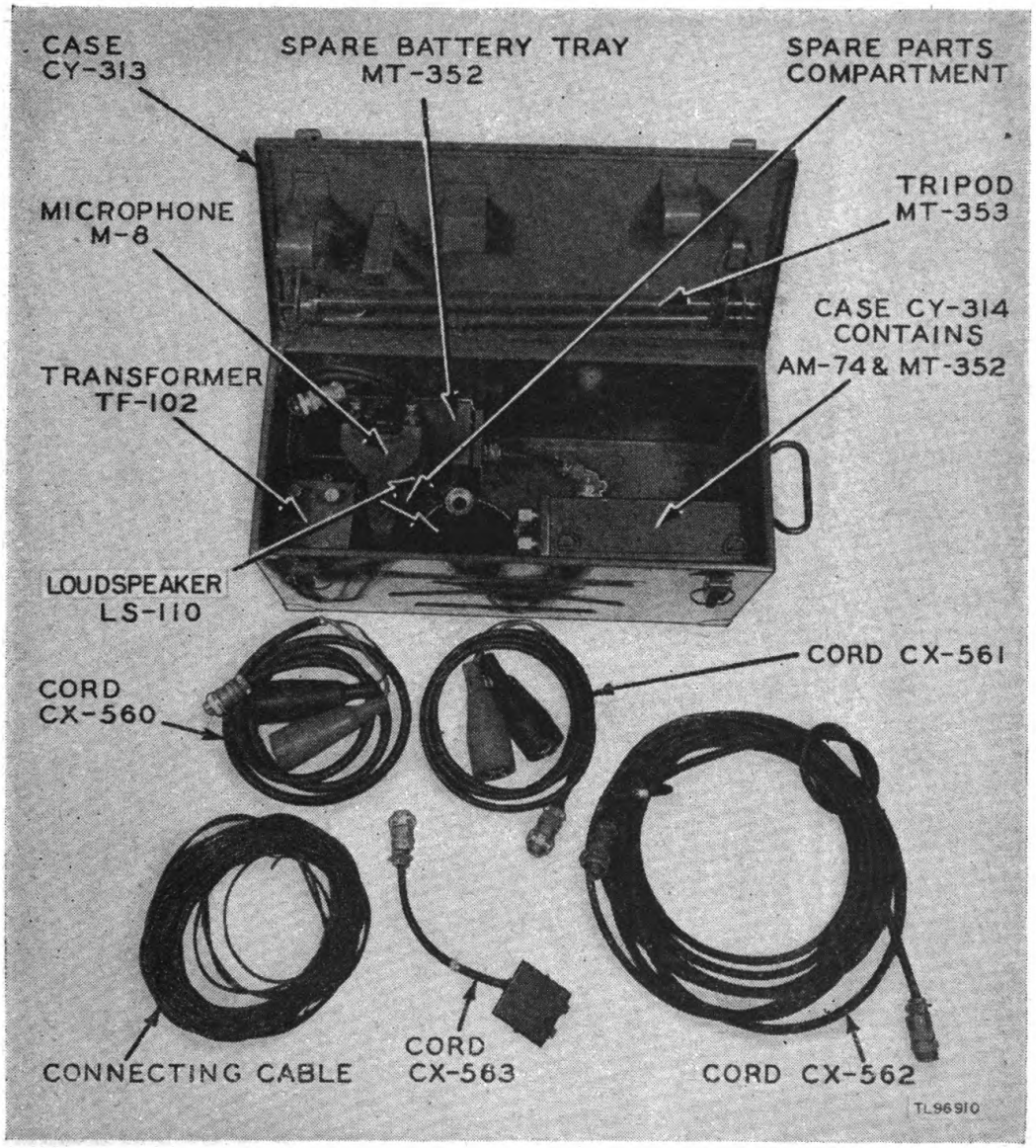


Figure 10. Components stored in carrying case, cords removed.

PART TWO
OPERATING INSTRUCTIONS

NOTE: For information on destroying the equipment to prevent enemy use, refer to the destruction notice at the front of the manual.

SECTION III
CONTROLS AND THEIR USES

12. AMPLIFIER CONTROL (fig. 11).

The VOLUME control knob is located in the center of the front panel of Amplifier AM-74 (fig. 2). By turning this knob clockwise the volume will increase and a turn in the opposite direction will decrease the volume.

13. MICROPHONE CONTROL (fig. 11).

Near the center of the plastic handle of Microphone M-8 is a push-button switch. When the push-button switch is pressed in, the equipment is immediately ready to operate. By releasing the switch the equipment is turned off.

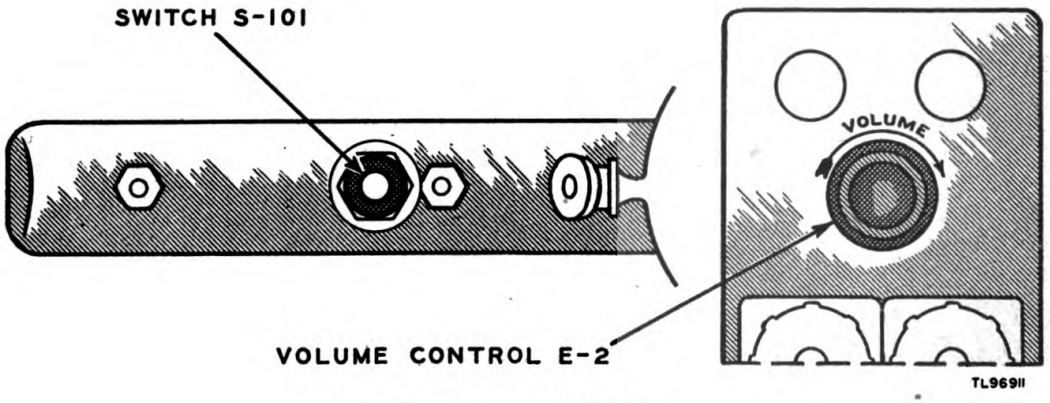


Figure 11. Controls.

SECTION IV
OPERATION

14. STARTING PROCEDURE.

After Public Address Set AN/PIQ-1 has been connected (par. 10) the equipment is ready for operation.

15. OPERATING PROCEDURE.

a. Depress the switch on the microphone.

b. Place the lower lip against the plastic saddle directly in front of the microphone unit of Microphone M-8. If a carbon-type microphone is used, it should be held rather close to the mouth.

c. Speak distinctly and slowly into the microphone and adjust the VOLUME control on Amplifier AM-74 to the desired strength. When the operator is not talking, the microphone switch should be released. This shuts off the equipment and gives longer life to the storage batteries.

16. STOPPING PROCEDURE.

When use of Public Address Set AN/PIQ-1 is no longer required, all components should be disconnected and repacked into carrying Case CY-313 as outlined in paragraph 11.

SECTION V
EQUIPMENT PERFORMANCE CHECK LIST

17. PURPOSE AND USE OF CHECK LIST.

a. General. The equipment performance check list (par. 18) will help the operator to determine whether Public Address Set AN/PIQ-1 is functioning properly. The check list gives the items to be checked, the conditions under which the item is checked, the normal indications of correct operation, and the corrective measures that the operator can take.

b. Normal Indications. The normal indications listed include the visible and audible signs the operator will perceive when he checks

the items. If the indications are not normal, the operator should apply the recommended corrective measures.

c. Corrective Measures. The corrective measures listed are those that the operator can make without turning the equipment in for repairs. If the equipment is completely inoperative, or if the recommended corrective measures do not yield results, trouble shooting by an experienced repairman is necessary.

18. EQUIPMENT PERFORMANCE CHECK LIST.

The procedure indicated in the following list will provide a single and rapid check to insure good operation.

EQUIPMENT PERFORMANCE CHECK LIST

Type of operation	Setting of controls	Normal indications	Corrective measures
Voice reproduction	Microphone switch on. VOLUME control advanced half way.	Voice should be heard in Loudspeaker LS-110.	Advance VOLUME control. Check the cable terminals and connectors for proper contact. Make certain all cables and terminals are properly connected as indicated in paragraph 10.

PART THREE
PREVENTIVE MAINTENANCE

SECTION VI
PREVENTIVE MAINTENANCE TECHNIQUES

19. MEANING OF PREVENTIVE MAINTENANCE.

Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs and unwanted interruptions in service and to keep the equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. The prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be over emphasized. It is vitally important that operators and repairmen maintain their equipment properly.

NOTE: The operations in section VI and VII are first and second echelon (organization operators and repairmen) maintenance. Some operations in section X are higher echelon maintenance.

20. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES.

a. General. Most of the electrical parts used in Public Address Set AN/PIQ-1 require routine preventive maintenance. Those requiring maintenance differ in the amount and kind required. Because hit-or-miss maintenance techniques cannot be applied, definite and specific instructions are needed. This section of the manual contains those specific instructions and serves as a guide for personnel assigned to perform the six basic maintenance operations namely: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate.

Throughout this manual the lettering system for the six operations will be as follows:

F—Feel*
I—Inspect
T—Tighten
C—Clean
A—Adjust*
L—Lubricate*

The first two operations establish the need for the other four. The selection of operations is based on a general knowledge of field need. For example, the dust encountered on dirt roads during cross-country travel filters into the equipment no matter how much care is taken to prevent it. Rapid change in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary performance of tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is most needed.

b. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidence of minor trouble. Although these defects may not interfere with the performance of the equipment, valuable time and effort can be saved if they are corrected before they lead to major break-downs. Make every effort to become thoroughly familiar with the indications of normal functioning in order to be able to recognize the signs of defective equipment. Inspection consists of carefully observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(1) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surfaces of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

---

*The Feel, Adjust, and Lubricate operations are inapplicable to Public Address Set AN/PIQ-1.

(2) Placement, by observing that all leads and cabling are in their original positions.

(3) Cleanliness, by carefully examining all recesses in the units for the accumulation of dust, especially between connecting terminals. Parts, connections, and joints should be free of dust and other foreign matter. In tropical or high-humidity locations, look for fungus growth and mildew.

(4) Tightness, by testing any connection or mounting which appears to be loose.

c. Tighten and Clean. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout part three.

CAUTION: Screws, bolts, and nuts should be tightened carefully. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

21. VACUUM TUBES.

a. Inspect (I).

(1) Inspect metal tube envelopes for accumulation of dirt and for corrosion. When tubes with loose envelopes are found, replace the tube.

(2) Remove the tube shields without bumping the tubes and inspect the firmness of the tubes in their sockets. Make the inspection by pressing the tubes down in the sockets and testing them in that position, *not* by partially withdrawing the tubes and jiggling them from side to side. Movement of a tube tends to weaken the pins in the base and unnecessarily spreads the contacts in the socket. It is desirable to inspect the socket of the tubes at the time the tubes are removed.

(3) When it is necessary to remove a tube from its socket great care must be used. Never jar a warm tube. Take care in putting the tube firmly back in its socket.

(4) Examine the tube shield for signs of corrosion and the spring for the loss of tension which will result in the tubes slipping from their sockets. Replace shields and springs in the proper position.

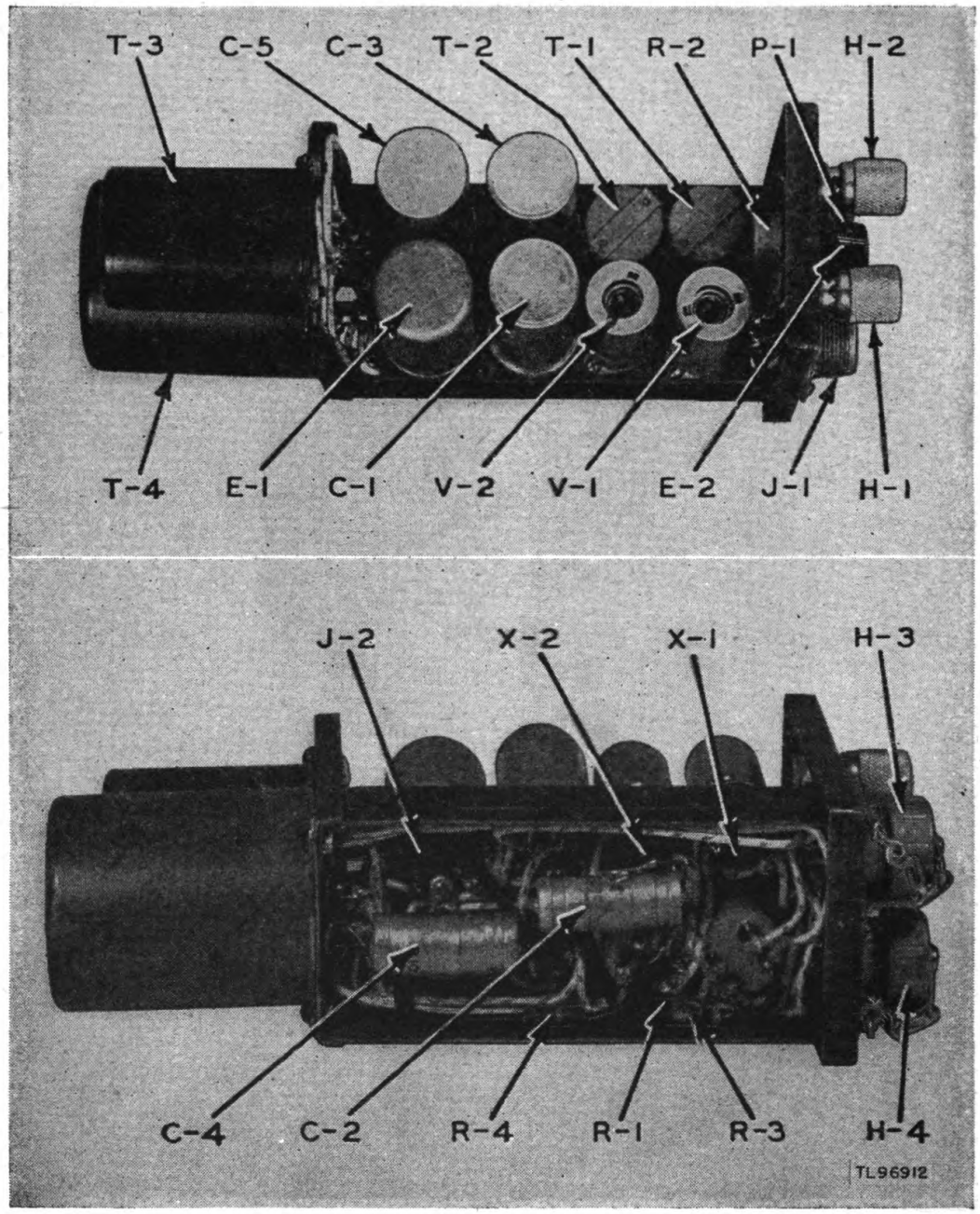


Figure 12. Top and bottom view of Amplifier AM-74.

b. Tighten (T). Tighten all loose connections to the tube sockets. If the connections are dirty or corroded, clean them. When tightening locknuts that hold the sockets to the chassis, do not apply excessive pressure. Too much pressure may strip the thread of the mounting screw.

c. Clean (C).

(1) Clean the tubes, if inspection shows cleaning to be necessary. The tubes operate at a low voltage and do not require frequent cleaning. Do not permit dirt to accumulate on them.

(2) Remove dust or dirt from the glass tubes or metal shields with a clean, lint-free cloth.

22. CAPACITORS.

a. Inspect (I).

(1) Inspect the terminals of all capacitors for corrosion and loose solder connections. Inspect the mountings for loose mounting screws or brackets. Examine the leads for poor insulation, cracks, and evidence of dry rot. Look for broken strands in the connecting wire. Any exposed portions of wire should be wrapped with friction tape.

(2) Thoroughly inspect the case of each capacitor for leaks, bulges, and discoloration.

b. Tighten (T). Tighten all loose mountings and brackets where required.

c. Clean (C). Clean the cases of all capacitors, the insulating bushings, and all connections that are dirty or corroded. A lint-free cloth should be used. If deposits of dirt are hard to remove, use a cloth moistened in Solvent, Dry Cleaning, Federal spec No. P-S-661a.

23. RESISTORS.

a. Inspection (I). Inspect the bodies of the resistors for blistering and discoloration which indicate overheating. Look for arc pits. Inspect all connections for corrosion, dirt, dust, and looseness. Look for broken strands in the connecting wire. Do not attempt to remove any pigtail resistor because of danger of breaking the pigtail connection where it enters the body of the resistor. Inspect the connections of pigtail resistors for proper soldering.

b. Clean (C). Clean pigtail resistors with a small brush dipped in dry-cleaning solvent (SD).

24. POTENTIOMETER.

a. Inspect (I). The mechanical operation of the VOLUME control should be checked. Inspect the assembly and mounting screws and nuts. All metallic parts should be inspected for dust, dirt, and corrosion.

b. Tighten (T). Tighten all loose assembly nuts.

25. TRANSFORMERS.

a. Inspect (I).

(1) Inspect transformers T-1, T-2, T-3, and T-4 for general cleanliness. Examine for tightness of connections, terminals, and mounting. Open the case of Transformer TF-102 and carefully inspect transformer T-701 and the wiring inside.

(2) Inspect all transformers for signs of overheating indicated by the presence of bulges in the case and discoloration.

b. Clean (C). The cases of the transformers should be cleaned with a cloth. In some instances it may be necessary to use dry-cleaning solvent (SD) to remove foreign matter. Corroded contacts on connections can be sandpapered and wiped clean.

c. Tighten (T). Tighten all loose mounting screws. Do not disturb the placement of any wires. If it is necessary to remove wires to tighten mounting screws, tag the wires before unsoldering so they can be restored to their original positions.

26. MICROPHONE.

a. Inspect (I). Inspect Microphone M-8 for dirt and cracks. No attempt should be made to disassemble the microphone.

b. Clean (C). Clean the housing of the Microphone M-8 with a clean, dry cloth.

27. BATTERIES.

a. Inspect (I). Check to see if the battery water is at the proper level. Look for cracks in the case or for corroded or poor connections. Follow the instructions printed on the battery case and Battery Tray MT-352 for refilling and charging. Cord CX-560 is

provided as an extension between the Battery Tray MT-352 and a battery charger.

b. Clean (C). Remove all dirt and corrosion with a dry cloth.

28. TRIPOD.

a. Inspect (I). Inspect the tripod for cracks or for excessive dirt. Test the legs at all lengths to be certain the catches are working.

b. Clean (C). Remove all dirt, dust, or moisture from the legs. Be sure the wingscrew is not stuck and is free to move.

29. LOUDSPEAKER.

a. Inspect (I).

(1) Inspect Loudspeaker LS-110 for accumulations of dust, dirt, and foreign matter.

(2) Inspect the terminal thumbscrews at the rear for loose or broken connections.

(3) Inspect the connection position between the body and horn of the loudspeaker for dirt and corrosion.

b. Tighten (T). Tighten all terminals.

c. Clean (C). Remove all dust, dirt, and lint with a clean, dry rag.

30. CABLES.

a. Inspect (I). Inspect the cable and the cords for cracked or deteriorated insulation, frayed or cut insulation at the connecting points.

b. Tighten (T). Tighten all loose cable clamps and connections.

c. Clean (C). Clean all the dirty and corroded connections. The easiest way to clean a dirty connection is to remove the connection and clean it with a brush dipped in dry-cleaning solvent (SD). Make sure that the connection is thoroughly dried with a dry cloth. Clean corroded connections with #0000 sandpaper.

SECTION VII

ITEMIZED PREVENTIVE MAINTENANCE

31. INTRODUCTION.

For ease and efficiency of performance preventive maintenance on Public Address Set AN/PIQ-1 will be broken down into operations that can be performed at different time intervals. In this section, the preventive maintenance work to be performed on Public Address Set AN/PIQ-1 at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in section VI. These general instructions are not repeated in this section. When performing preventive maintenance, refer to section VI if more information is required for the following items. All work is to be performed with the power removed from the equipment. After preventive maintenance has been performed on a given day, the equipment should be put into operation and checked for satisfactory performance. See paragraph 18 Equipment Performance Check List.

32. COMMON MATERIALS NEEDED.

The following materials will be needed in performing preventive maintenance:

Clean cloth
#0000 sandpaper
Solvent, Dry Cleaning, Federal spec No. P-S-661a
Distilled water

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, Dry Cleaning, is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, may be used for cleaning purposes when dry-cleaning solvent (SD) is not on hand. Carbon tetrachloride will be used as a cleaning fluid only in the following cases: where inflammable solvents cannot be used because of the fire hazard, and for cleaning electrical contacts including relay contacts, plugs, commutators, etc.

33. PREVENTIVE MAINTENANCE CHECK LIST.

The following check list is a summary of the preventive maintenance operation to be performed on Public Address Set

AN/PIQ-1. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for on the check list. The echelon column indicates which operations are second echelon maintenance. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the Operations column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

Item No.	Operation	Item	When performed					
			Before operation	After operation	Daily	Weekly	Mo.	Echelon
1	ITC	Loudspeaker			X			1st
2	ITC	Tubes and Sockets	X				X	1st
3	IC	Capacitors		X			X	2nd
4	IC	Resistor		X			X	2nd
5	IT	Potentiometers	X				X	2nd
6	ITC	Transformers		X			X	2nd
7	IC	Microphone	X		X			1st
8	IC	Batteries		X	X			1st
9	IC	Tripod		X	X			1st
10	ITC	Cables	X			X		1st

F* Feel I Inspect T Tighten C Clean A* Adjust L* Lubricate

SECTION VIII
LUBRICATION

NOTE: No lubrication is required for Public Address Set AN/PIQ-1.

*The Feel, Adjust, and Lubricate operations are inapplicable to Public Address Set AN/PIQ-1.

PART FOUR
AUXILIARY EQUIPMENT

SECTION IX
AUXILIARY EQUIPMENT USED

34. POWER SUPPLY.

A 6-volt, d-c external source of power should be used when continuous operation is desired. Connect the equipment as described in paragraph 10c(1).

Figure 13. Public Address Set AN/PIQ-1 used with Chest Set TD-4.

35. USE OF BATTERY CHARGER.

When charging batteries, remove the battery tray from Case CY-314. Connect Cord CX-560 to the battery tray as described in paragraph 7k(1). Charge batteries in accordance with instructions accompanying the battery-charging equipment and instructions printed on the side of Battery Tray MT-352.

36. USING PUBLIC ADDRESS SET AN/PIQ-1 WITH AUXILIARY EQUIPMENTS.

Figures 13 to 16 illustrate uses of Public Address Set AN/PIQ-1 with various other items of equipment. The mounting methods illustrated may be improvised in the field to suit individual needs.

Figure 14. Public Address Set AN/PIQ-1 used with Cord CD-318-A.

Figure 15. Public Address Set AN/PIQ-1 with auxiliary loudspeaker mounted in rear on jeep.

Figure 16. Public Address Set AN/PIQ-1 with auxiliary loudspeaker mounted on hood of jeep.

PART FIVE
REPAIR INSTRUCTIONS

NOTE: Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form No. 54 (Unsatisfactory Report). If either form is not available, prepare the data according to the sample form reproduced in figure 22.

SECTION X
THEORY OF EQUIPMENT

NOTE: For ease of identification of tubes in the following paragraphs the reference numbers are used. These reference numbers appear stamped on the bottom of the chassis of Amplifier AM-74. A table showing reference numbers and Joint Army-Navy nomenclature of tubes follows:

TUBE IDENTIFICATION CHART

Reference No.	JAN nomenclature
V-1	JAN-3A5
V-2	JAN-3A5

37. MICROPHONE M-8.

Microphone Unit MC-419 is the lip microphone mounted on Microphone M-8. It is a single-button carbon microphone. The button contains a large number of tiny carbon granules. When sound waves enter the microphone, they cause the diaphragm, a thin metallic disk, to vibrate and thus alternately compress and release the carbon granules. This causes the resistance, which the carbon granules offer, to vary, thus affecting the amount of current flow. Microphone Unit MC-419 is designed to reduce background noise and sounds, other than the speech of the operator.

This is accomplished in the following manner: the operator's speech enters the microphone on one side of the diaphragm causing it to vibrate. The structure of the microphone permits incidental noise and sounds to enter simultaneously on both sides of the diaphragm. Thus the effect of the sounds on one side of the diaphragm cancels the effects on the other side and the noise is either eliminated or reduced to an insignificant level.

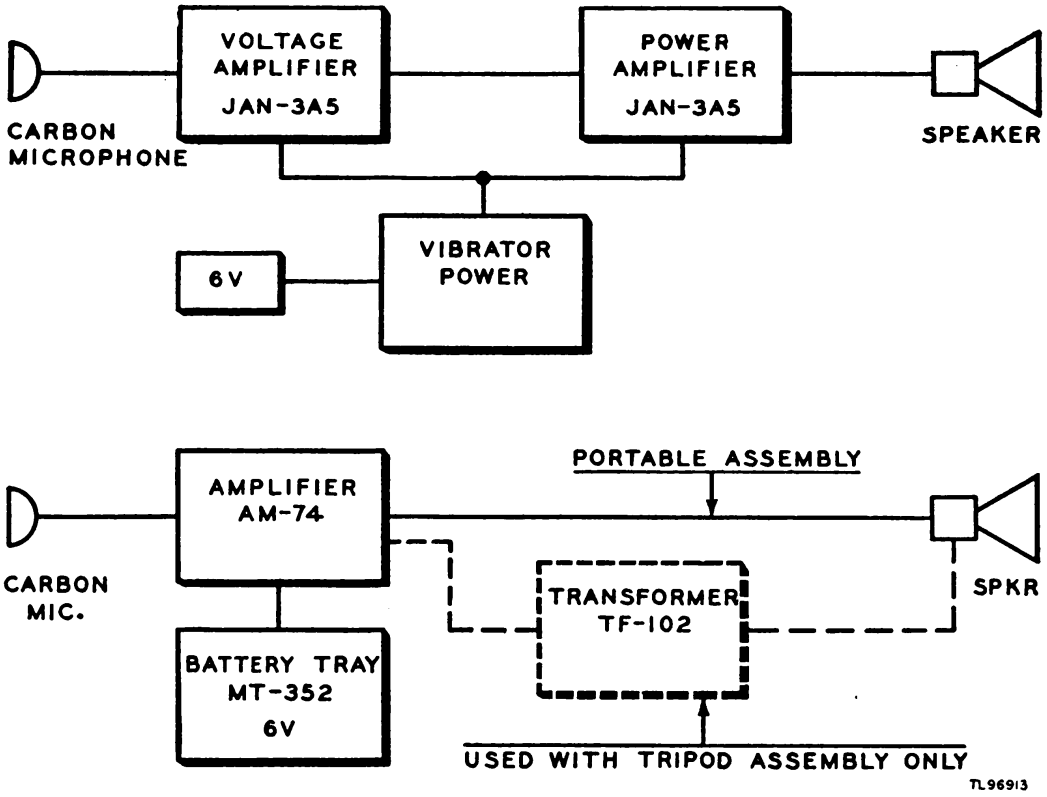


Figure 17. Over-all block diagram and block diagram of amplifier stage.

38. AMPLIFIER AM-74 (figs. 17 and 18).

a. General. Amplifier AM-74 is composed of the following five circuits.

(1) Microphone-supply Circuit. Through dropping resistor R-1, microphone voltage is supplied from the battery. Capacitor C-1a is the audio-frequency bypass capacitor.

(2) Audio-amplifier Circuit. The Amplifier AM-74 is a two-stage audio amplifier. The voltage, induced in the secondary of transformer T-1 by the microphone circuit, is amplified by tube

V-1, which is the driver for tube V-2, through transformer T-2. The output of tube V-2 is coupled through transformer T-3 to the speaker.

(3) Filament-supply Circuit. The filaments of the two Tubes JAN-3A5 are hooked in series and power is supplied from Battery Tray MT-352 or an external 6-volt, d-c source.

(4) Grid-supply Circuit. Resistors R-3 and R-4 are in series between ground and the B minus return. The voltage drop across resistor R-4 is used as bias for the tubes. The combined drop across resistors R-3 and R-4 is used as a grid bias on tube V-1.

(5) Plate-supply Circuit. The plate supply circuit consists of a synchronous vibrator E-1, transformer T-4 (consisting of the low- and high-voltage chokes) and all capacitors. This circuit converts 6-volt, d-c power to approximately 140-volt, d-c power. This is done in the following manner. The vibrator interrupts the 6-volt, d-c input in the primary of the transformer located in T-4. As a result an a-c voltage is formed in the secondary of the transformer. This voltage is rectified by a second set of contacts in the vibrator E-1. Consequently pulsating d-c voltage is filtered by the high-voltage choke in transformer T-4 and the double section capacitor C-3 and supplied to the audio-amplifier circuit.

39. TRANSFORMER TF-102.

Transformer TF-102 is not used when Public Address Set AN/PIQ-1 is used as a portable unit (fig. 6). It is necessary to use Transformer TF-102 when the tripod is used partly as a mechanical support and partly for its electrical function. When the tripod is used Transformer TF-102 and Amplifier AM-74 are connected by 25 feet of cable. Transformer TF-102 matches the 250-ohm impedance of Amplifier AM-74 to the 15-ohm impedance of Loudspeaker LS-110.

40. LOUDSPEAKER LS-110.

Loudspeaker LS-110 houses one blastproof driver unit. This driver unit consists of a powerful permanent magnet terminating in a cylindrical shape air gap. A winding, known as the voice coil, is located in this gap. A diaphragm is also part of the voice-coil structure. When current flows through the winding of the voice

coil, a magnetic field is developed around the coil. This magnetic field reacts with the magnetic field of the permanent magnet, causing the voice coil to move. In use, the amplifier provides a varying current through the voice coil in accordance with the variations of speech entering the microphone. As a result, the voice coil and diaphragm will move back and forth, reproducing the original sounds.

SECTION XI
TROUBLE SHOOTING

41. GENERAL TROUBLE-SHOOTING INFORMATION.

No matter how well equipment is manufactured, faults occur in service. Repairmen must locate and correct these faults as quickly as possible. This section contains general information to aid personnel engaged in the important duty of trouble shooting.

a. Trouble-shooting Data. Take advantage of the material contained in this manual to help in the rapid location of faults. Consult the following trouble-shooting data when necessary.

(1) All photographs.
(2) Schematic diagram (fig. 18).
(3) Voltage and resistance data (fig. 19).
(4) Top and bottom view of Amplifier AM-74 (fig. 10).
(5) Operator's trouble-shooting chart (par. 51).
(6) Repairman's trouble-shooting chart (par. 52).
(7) Repairman's trouble-shooting chart (tube troubles) (par. 53).
(8) Cords wiring diagram (fig. 20).

b. Trouble-Shooting Steps. The first step in servicing a defective amplifier is to sectionalize the fault. *Sectionalization* means tracing the fault to the stage responsible for the abnormal operation of the unit. The second step is to localize the fault. *Localization* means tracing the fault to the defective part responsible for the abnormal condition. Some faults, such as burned-out resistors, can be located by sight, smell, and hearing. The majority of faults, however, must be located by checking voltages and resistances.

42. TEST EQUIPMENT REQUIRED.

The only equipment required for testing Public Address Set AN/PIQ-1 is a volt-ohm milliammeter of a high-resistance type. All voltage and resistance measurements shown in figure 19 should be duplicated ±10 percent. The meter used in these measurements was of the 20,000-ohms-per-volt, d-c, 1,000-ohms-per-volt, a-c type. For details of operation of the test equipment see the operating instructions accompanying the equipment. No test equipment is furnished with Public Address Set AN/PIQ-1. Test Unit I-176 (TM 11-2626), or a comparable type of available test equipment, is suggested.

43. INSPECTION.

Before starting an elaborate test procedure, make an inspection in an attempt to locate the fault. Note the following points:

a. With Power Off. Look for abnormal indications such as broken parts, loose connections, burned resistors, wax drippings from capacitors, bent pins on the connection plugs, or loose pieces of wire or metal. Smell for evidences of overheated parts such as overloaded or burned-out transformers. Such indications will often save a great deal of time in locating a fault.

b. With Power On. Apply power and observe the tubes to see whether the heater or filaments are glowing.

c. Limitations. Do not depend wholly on visual inspection, especially in searching for defective connections. Usually the trouble can be located more quickly after rapid visual inspection has been made following the normal trouble-shooting procedures.

44. SECTIONALIZATION.

a. The starting procedure is to determine whether the trouble is located in the amplifier unit or the battery tray. This procedure is used in sectionalization when the cause of failure is not known.

b. The first chart (par. 51) covers sectionalization of trouble in Public Address Set AN/PIQ-1. This chart lists the various symptoms which may be easily recognized by the operator, and gives the probable location for existing trouble as well as the recommended correction. It will enable the operator to isolate trouble to one particular part of the equipment, saving time that otherwise might be lost in checking trouble-free components.

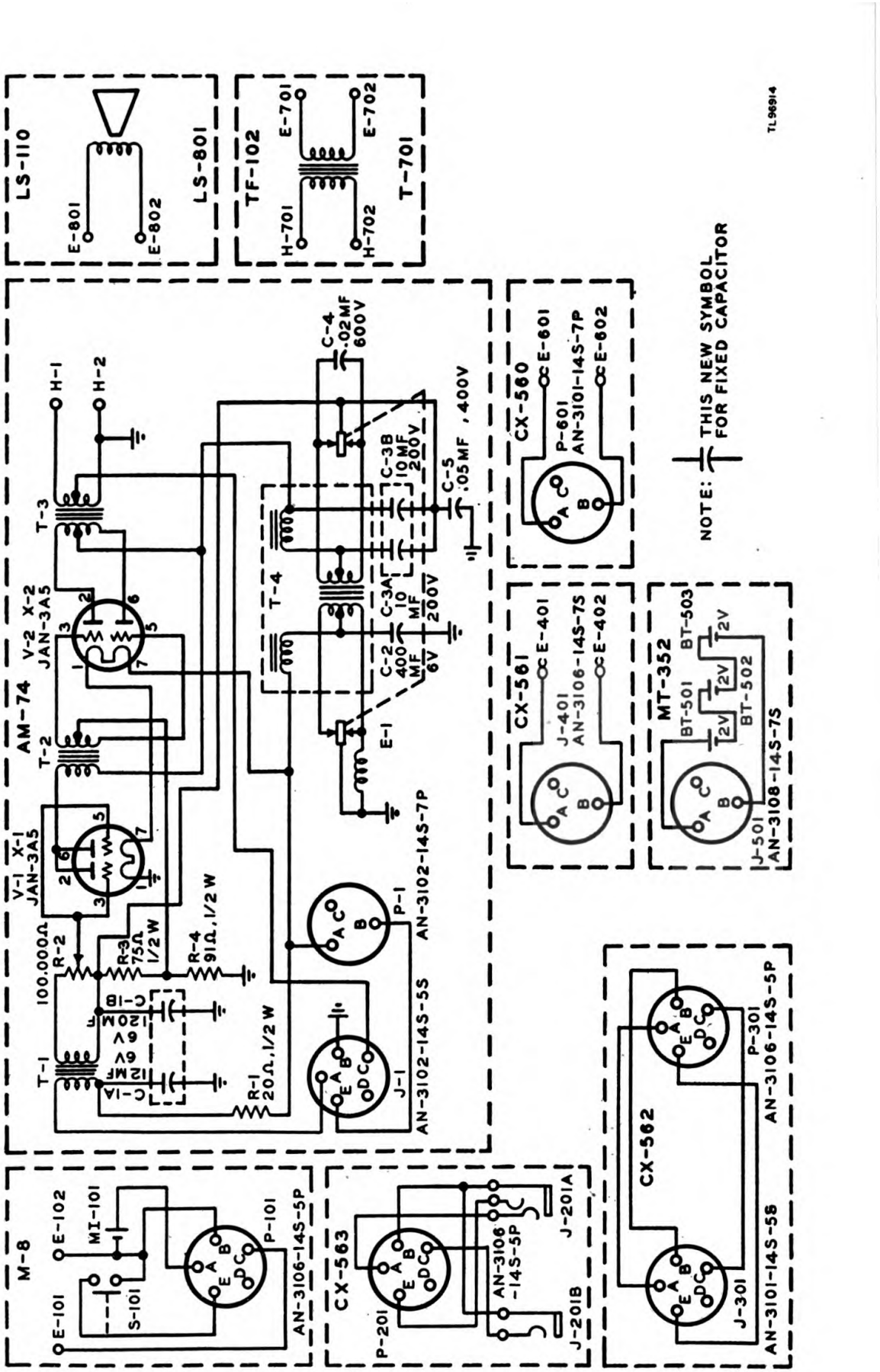


Figure 18. Schematic diagram.

45. TROUBLE LOCATION CHECK.

When trouble exists in the unit, a great deal can be gained without disassembling the unit. The following simple checks immediately establish the proper operation of various elements of stages which may include the defective components. The trouble-shooting charts in paragraphs 51, 52, and 53 can be used with greater facility.

a. Filament-circuit Check. With the equipment assembled for operation, remove the Battery Tray MT-352 and Amplifier AM-74 from their case. Push the switch in on the microphone handle and check to see if the tubes light. This indicates the filament circuit of each tube has continuity.

b. Tube Check. The most general cause of improper operation of electronic equipment is tube failure. A tested Tube JAN-3A5 should be kept on hand at all times. Keep all spare parts for this equipment high, dry, and clean, ready for use at any time.

46. LOCALIZATION.

a. General. When it has been established that the fault is in the amplifier unit, the next step is to localize the fault to a particular part such as a resistor, a capacitor, a loose connection, etc. The quickest way to accomplish this is to make a thorough resistance and voltage check of the stage until the fault is found. Figure 19 shows the resistance and voltage at every socket-pin connection. Paragraph 52 lists faults which will require internal repairs on Amplifier AM-74. These servicing procedures should be performed only by a competent repairman.

b. Visual Inspection. In determining the cause of faulty amplifier performance, make a careful visual inspection of the amplifier. The fault may be due to a drop of solder, a defective socket, the end of a connector protruding through the solder lug and touching the chassis, or another grounded conductor, etc. These faults may not always be revealed by a visual inspection, but will eventually show up when a resistance check of the stage is made.

c. Effect of Low Screen or Plate Voltage. The effect of low screen or plate voltage is to decrease the amplification of the stage. This type of fault can be located by resistance and voltage measurements.

d. Effect of Open Transformer. An open transformer will automatically render the amplifier inoperative. No signal will appear on the grid of the following stage or, as in the case of the output

transformer T-3, no signal will appear across the secondary terminals of the output transformer.

e. Open Grid Circuit. When the transformer grid circuit of a tube opens up, the effect depends on the type of tube and the circuit. In general, the equipment will perform erratically. An open transformer grid circuit will be disclosed by a resistance check of the stage.

f. 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 a transformer.

47. VOLTAGE MEASUREMENTS.

a. General. Voltage measurements are an indispensable aid to the repairman, because most troubles either result from abnormal voltages or produce abnormal voltages. Voltage measurements are easily made, because they are always 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 chart (fig. 19). Unless otherwise specified, the voltages are measured between the indicated points and ground.

(2) Always begin by setting the voltmeter on the highest range so that the voltmeter will not be overloaded and therefore made unserviceable. Then, if it is necessary to obtain increased accuracy, set the voltmeter to a low range.

(3) The voltage measurements obtained may not exactly agree with the voltages specified in the voltage-resistance drawings. Because of variations in tubes and other circuit components, consider the specified voltage values only as approximations in most cases. As long as the result obtained does not differ greatly from the specified figure, it is probable that the component in question is not defective.

b. Voltmeter Loading. It is essential that the voltmeter resistance be at least 10 times as large as the resistance of the circuit across which the voltage is measured. If the voltmeter resistance is comparable to the circuit resistance, the voltmeter will indicate a lower voltage than the actual voltage present with the voltmeter removed from the circuit.

(1) The resistance of the voltmeter on any range can be calculated by the following simple rule: the resistance of the

voltmeter equals the ohms-per-volt rating of the voltmeter multiplied by the full-scale range in volts. Two examples are shown below:

(a) What is the resistance of a 1,000-ohm-per-volt voltmeter on a 300-volt range?

R = 1,000 ohms per volt x 300 volts = 300,000 ohms.

(b) What is the resistance of a 20,000-ohm-per-volt voltmeter on a 300-volt range?

R = 20,000 ohms per volt x 300 volts = 6 megohms.

(2) To minimize voltmeter loading in high-resistance circuits, use the highest voltmeter range. Although only a small deflection will be obtained (possibly only 5 divisions on a 100-division scale) the accuracy of the voltage measurement will be increased. The decreased loading of the voltmeter will more than compensate for the inaccuracy which results from reading only a small deflection on the scale of the voltmeter.

(3) When a voltmeter is loading a circuit, the effect can always be noted by comparing the voltage readings on two successive ranges. If the voltage readings on the two ranges do not agree, the voltmeter loading is excessive. The reading (not the deflection) on the highest range will be greater than the lowest range. If the voltmeter is loading the circuit heavily, the deflection of the pointer will remain nearly the same when the voltmeter is shifted from one range to another.

(4) The voltage-resistance drawing used in this manual is based on readings taken with an actual meter. The ohms-per-volt sensitivity of the meter which was used is 20,000 ohms-per-volt. The trouble shooter should use a meter having the same ohms-per-volt sensitivity. Because the meter used in testing the voltage will produce the same amount of loading as the meter used in measuring the voltage, it is unnecessary to consider the effect of loading, if the most accurate range is used.

c. Practical Example of Voltage Analysis. Figure 19 gives the voltage at each socket connection. Two examples of voltage-reading indications follows:

(1) Pin one of tube V-1 shows 0 voltage. The repairman finds 6 volts on pin one. This should indicate to the serviceman that the connection between the pin and ground is broken.

(2) Pin two shows a voltage of 120. If the repairman finds a voltage of 60 volts, it would indicate the batteries are low. If a

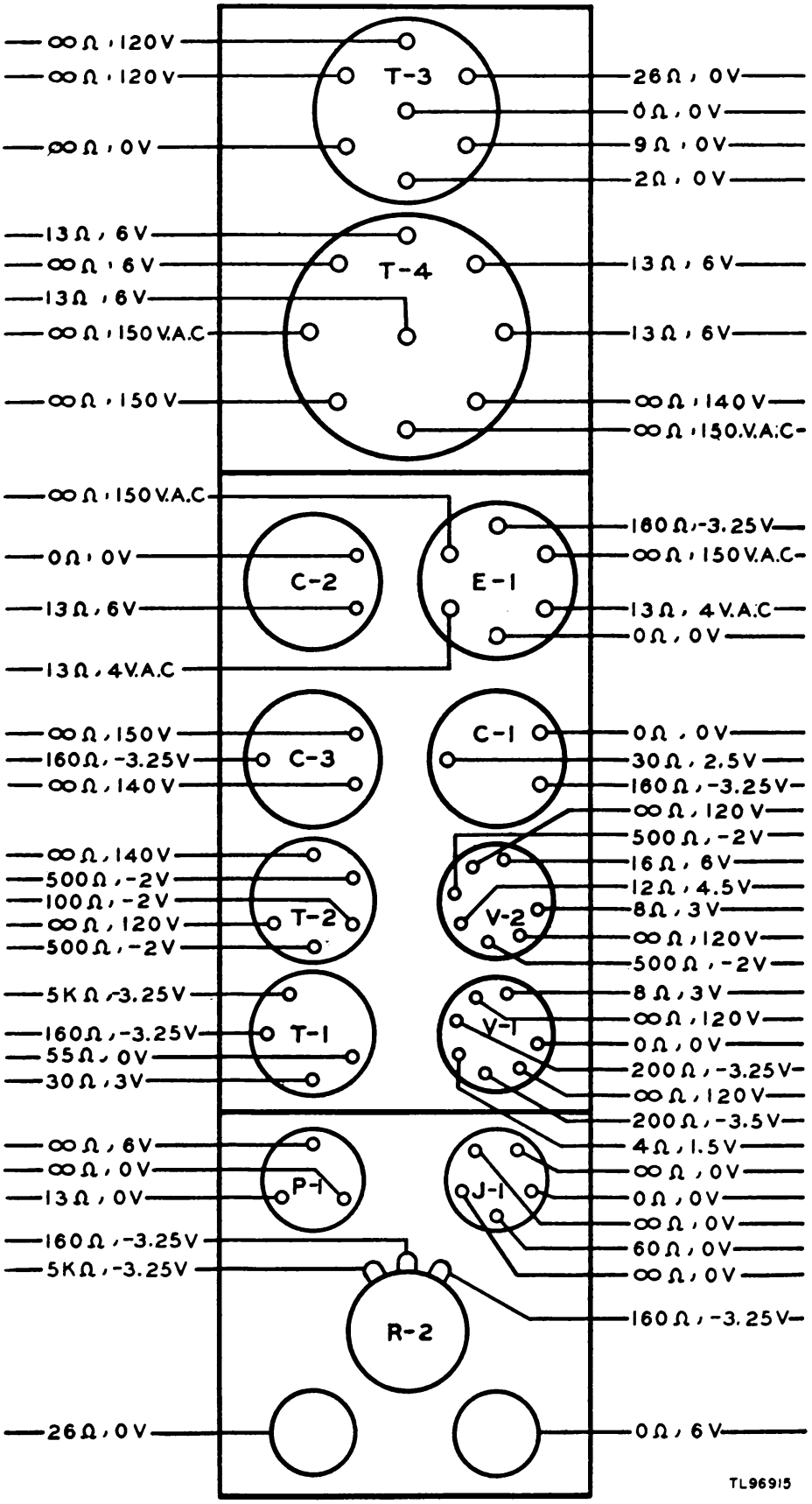


Figure 19. Voltage and resistance chart.

zero voltage is indicated, the repairman should use the schematic diagram and trace it back toward the power supply. Then voltage readings should be taken at various points toward the power supply until voltage is indicated. This will localize the trouble.

48. RESISTANCE MEASUREMENTS.

a. Normal Resistance Values. When a fault develops in a circuit, its effect will very often show up as a change in the resistance values. To assist in the localization of such faults, trouble-shooting data includes the normal resistance values as measured at the tube, vibrator, capacitor, and transformer terminals. These values are measured between the indicated points and ground. The normal resistance values at any point can be determined by referring to the resistance values shown in the schematic diagram (fig. 18) and by use of the resistor color code (fig. 21).

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 voltages in it, the needle will be deflected off scale and the meter movement may be burned out.

c. Corrected Use of Low and High Ranges. It is important to know when to use the low-resistance range and when to use the high-resistance range of an ohmmeter. When checking the circuit continuity, the ohmmeter should be set on the lowest range. If a 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 resistance or measuring the leakage resistances of capacitors and cables, the highest range should be used. If a low range is used, the pointer will indicate infinite ohms, even though the actual resistance is less than a megohm.

LEGEND FOR FIGURE 19. VOLTAGE AND RESISTANCE CHART.

All voltages and resistances measured to ground.

VOLTAGES.

D-c voltages read with a 20,000-ohm/voltmeter and read on the 10-250 volt scales.

A-c voltages read with 1,000-ohm/voltmeter and read on the 10-250 volt scales.

Tubes in, power on, volume control minimum, 6-volt, d-c power supply.

All voltages d-c unless otherwise indicated.

RESISTANCES.

Resistances are measured on the 3,000-3,000,000-ohm scales. Tubes in, power plug out, microphone plug out, volume control minimum.

Infinite ( ) ohms amount to about 5 megohms or better.

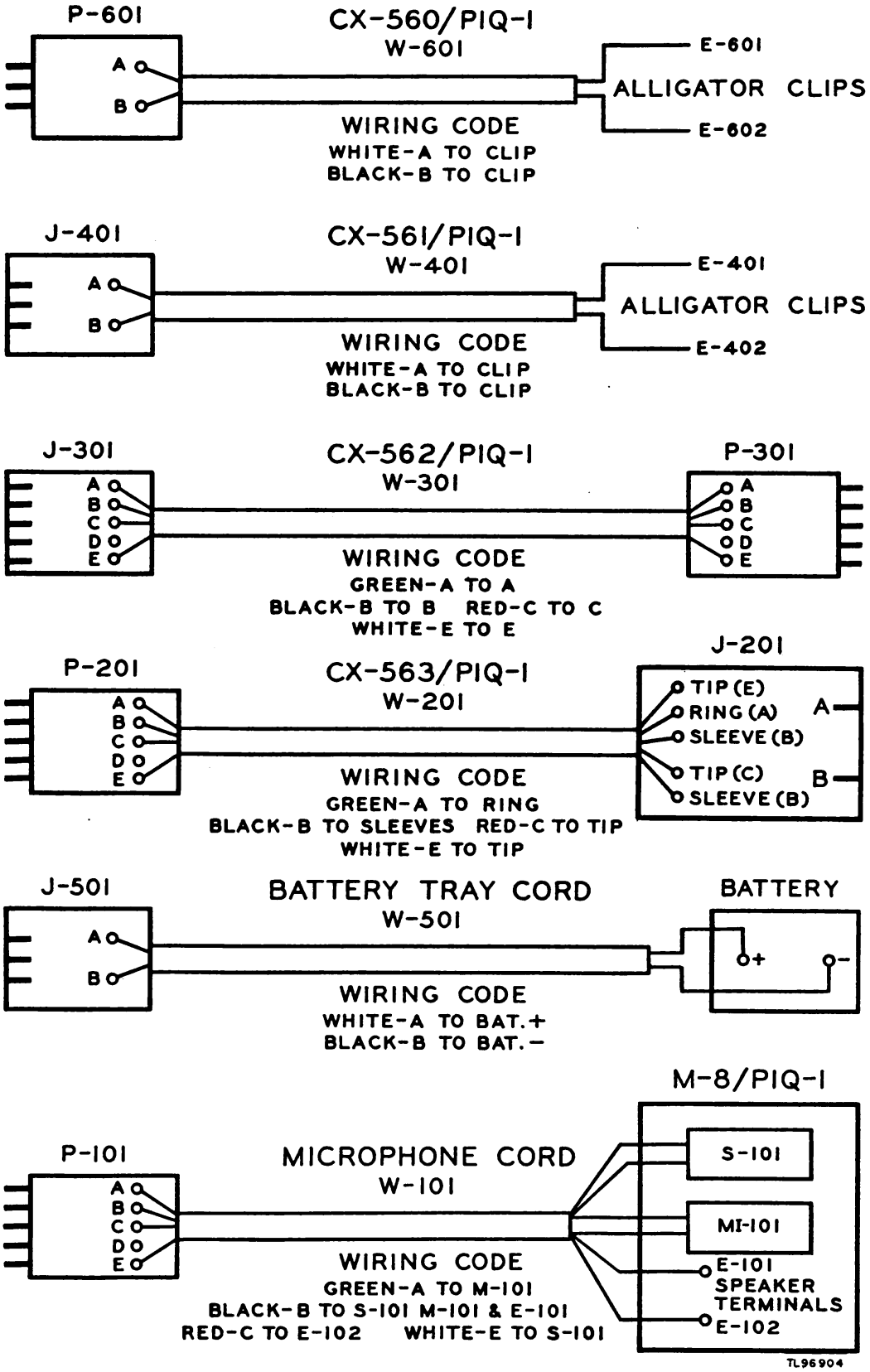


Figure 20. Cords wiring diagram.

d. Parallel Resistance Connection. 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.

(1) When a resistance is measured and the value is found to be less than expected, make a careful study of the schematic to be certain that there are no resistances in parallel with the one that has been measured. Before replacing a resistor, because its resistance measures too low, disconnect one terminal from the circuit and measure its resistance again, to make sure that the low reading does not occur because some part of the circuit is in parallel with the resistor.

(2) In some cases it will be impossible to check a resistor because it has a low-voltage transformer winding connected across it. If the resistor must be checked, disconnect one terminal from the circuit before measuring its resistance.

e. Checking Grid Resistance. When checking grid resistance, a false reading may be obtained if the tube is still warm and the cathode is emitting electrons. Allow the tube to cool.

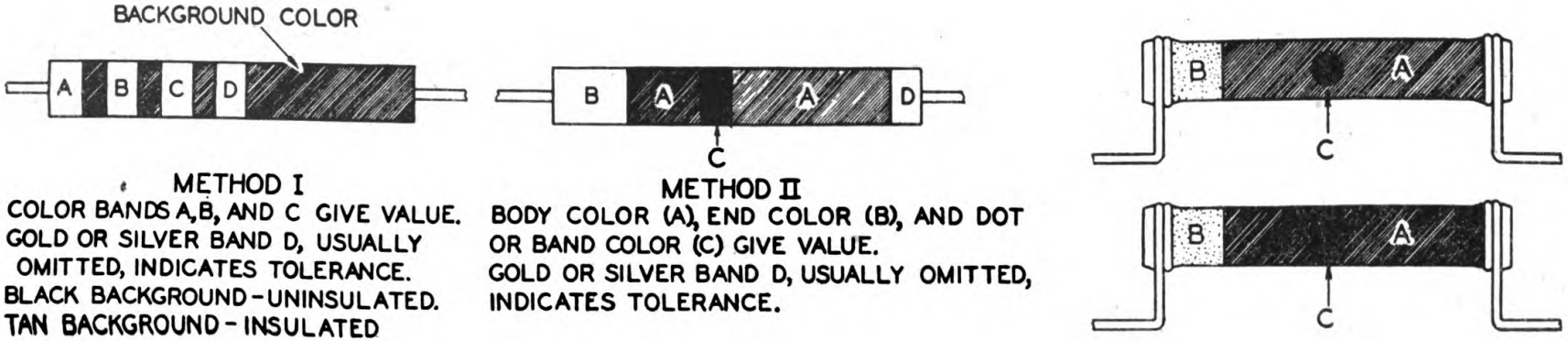
f. Tolerance Values for Resistance Measurements. Tolerance means the normal difference that is expected between the rated value of the resistor and its actual value.

(1) Most resistors that are used in radio circuits have a tolerance of at least 10 percent. For example, the grid resistor of a stage might have a rated value of one megohm. If the resistor were measured and found to have a value between 0.9 megohm and 1.1 megohms, it would be considered normal. As a rule, the ordinary resistors used in circuits are not replaced unless the values are off more than 10 percent.

(2) The tolerance values for transformer windings are generally between 1 and 5 percent. As a rule, suspect a transformer which shows a resistance deviating more than 5 percent from its rated value.

g. Color Codes. Resistor color codes are included in this manual (fig. 21). These codes or the schematic diagram can be used for checking the rated resistor values.

h. Practical Examples of Resistance Analysis. The schematic and the voltage-resistance diagram will be used for the following examples.



METHOD I

COLOR BANDS A, B, AND C GIVE VALUE.
GOLD OR SILVER BAND D, USUALLY OMITTED, INDICATES TOLERANCE.
BLACK BACKGROUND - UNINSULATED.
TAN BACKGROUND - INSULATED

METHOD II

BODY COLOR (A), END COLOR (B), AND DOT OR BAND COLOR (C) GIVE VALUE.
GOLD OR SILVER BAND D, USUALLY OMITTED, INDICATES TOLERANCE.

Figure 21. Resistor color code.

COLOR	FIGURE
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

COLOR A GIVES FIRST FIGURE OF RESISTOR VALUE.

COLOR B GIVES SECOND FIGURE OF RESISTOR VALUE.

COLOR C GIVES NUMBER OF CIPHERS FOLLOWING THE FIRST TWO FIGURES.

COLOR D: GOLD BAND INDICATES ±5% TOLERANCE.
SILVER BAND INDICATES ±10% TOLERANCE.
NO BAND INDICATES STANDARD ±20% TOLERANCE.

EXAMPLES

RESISTANCE OHMS	COLOR CODE			
	A	B	C	D
43000 ±5%	YELLOW	ORANGE	ORANGE	GOLD
3900 ±10%	ORANGE	WHITE	RED	SILVER
68 ±20%	BLUE	GRAY	BLACK	NONE

TL53514

CAUTION: Always release the microphone switch before attempting to make any resistance measurements.

(1) The resistance to ground on pin one of tube V-1 should be 0 ohms. If a resistance is indicated on this pin the lead to ground must be broken.

(2) The resistance-voltage diagram shows a resistance of 160 ohms on a terminal of transformer T-1. If 90 ohms are indicated by the ohmmeter on this terminal, resistor R-3 is shorted out and should be replaced.

(3) Binding post H-1 should show a resistance of 26 ohms. If 0 ohms are indicated by the ohmmeter, the terminal of transformer T-3 secondary is shorted to ground.

49. CAPACITOR TESTS.

a. Capacitor Defects. It is often necessary and desirable to check capacitors for leakage or an open or shorted circuit. Although open circuits sometimes occur in paper-type capacitors, because of the metal terminal tab pulling away from the tinfoil plates, this trouble is rare. The usual trouble in capacitors is a short circuit or leakage caused by the break-down of the dielectric between the plates. This applies only to capacitors of the tinfoil-paper or mica type because the dielectric film of wet, electrolytic capacitors is self-healing.

b. Open Capacitor. A capacitor which is suspected of being open can best be checked by shunting a good capacitor across it. In low-frequency circuits (less than one mc) the test capacitor leads may be several inches long.

c. Kick Indication. It is not practical to use the ohmmeter method for measuring leakages in paper or mica capacitors unless an exceptionally high reading megohmmeter is available. However, the ohmmeter may be used to obtain a *kick* indication. In this method, remove one end of the capacitor from its circuit before attempting to check it. This is done because the capacitor is usually across some other circuit element. When an ohmmeter is adjusted for its highest range and is connected across a good paper or mica capacitor, the needle will flick over slightly showing that the capacitor has taken a charge and is neither open nor shorted. If the needle does not go back to zero, the capacitor is leaky and should be replaced. This test does not apply to capacitors which are smaller than 0.05 mf.

d. Charging Test. Tinfoil-paper filter capacitors may also be tested for break-down by several other methods. One of the simplest is to disconnect the capacitor from the circuit and apply from 90 to 150 volts dc directly to its terminals by means of a d-c supply. The voltage applied to the capacitor should not exceed its rated voltage. Immediately after charging, disconnect the capacitor and short-circuit its terminals with an insulated cord or screw-driver. This should produce a small flash, the size of the flash depending on the capacitance of the capacitor, and the voltage used for charging. If a capacitor has a short circuit between its plates, no charge will be restored by them and no flash will be produced.

e. Leakage Test. This type of capacitor may also be tested for leakage by charging it and noting the intensity of the flash when it is discharged. Recharge it, disconnect it from the charging circuit, and after an interval, discharge it. If the resulting flash is much less intense than before, it is evident the leakage exists between the capacitor plates.

50. TUBE CHECKING.

a. Purpose. Tubes are most frequently the cause of defective operation. For this reason, the first step in trouble-shooting within a component is to check and replace any tube whose failure could account for the observed symptoms. A third chart (par. 53), for tube troubles, lists abnormal pin voltages, probable causes and the required remedy to correct the fault. This chart will enable the repairman to make a rapid check of the possible cause of the trouble. Tube checkers are used to check the emission of electrons from the cathode and to test shorted elements. Tube checkers will not test the performance of some special tubes, but are useful, however, for checking receiving type tubes.

b. Replacement Test. The final test of a tube must be its replacement with a tube known to be good. In many cases, it is quicker and more reliable to replace a doubtful tube with a good one than to check it with a tube checker. If the substitution of a tube does not cure the fault, install the original tube. Be sure bad tubes are not mixed with good tubes as this would make future substitutions unreliable and even harmful.

51. OPERATOR'S TROUBLE-SHOOTING CHART.

Symptoms	Probable trouble	Corrections
1. Switch S-101 pushed in, no sound output.	1. Defective Switch S-101.	1. Check visually for damage.
	2. Defective Microphone M-8.	2. Check visually for damage.
	3. Defective Loudspeaker LS-110.	3. Check visually for damage.
	4. Discharged batteries.	4. Replace with spare Battery Tray MT-352 and recharge batteries.
	5. Defective Amplifier AM-74.	5. Check visually for damage.
	6. Defective cords or connectors.	6. Check visually for damage.
	7. Defective tubes or vibrator.	7. Replace with new part.

52. REPAIRMAN'S TROUBLE-SHOOTING CHART.

Symptoms	Probable trouble	Corrections
1. No indications of power or sound output.	1. Microphone M-8 or cable.	1. Check for continuity across P-101. Repair or replace.
	Switch S-101 and cable.	Check for continuity across P-101 when switch is depressed.
	Battery Tray MT-352 and cable.	Check for voltage, 6V, across J-501.
	Amplifier AM-74.	With equipment connected together outside Case CY-314, check voltages at V-1 and V-2.
	Loudspeaker LS-110 and cable.	Check continuity between P-101 and E-101 and E-102.
2. Vibrator "hash" but no sound output.	2. Defective Microphone M-8.	2. Replace microphone.

52. REPAIRMAN'S TROUBLE-SHOOTING CHART (contd).

Symptoms	Probable trouble	Corrections
3. Tubes V-1 and V-2 glow but no sound output.	3. Defective microphone.	3. Replace microphone.
	Defective loudspeaker.	Replace loudspeaker.
4. Amplifier operates but with reduced gain.	Defective vibrator.	Replace vibrator.
	4. Defective tube V-1 or V-2.	4. Replace tubes V-1 and V-2 one at a time.
	Defective components in amplifier circuit.	Check with figure 18 and replace defective component.
5. Sound output but with loud hum.	5. Open capacitors C-2, C-3a and C-3b.	5. Replace defective capacitors.
	Defective choke in T-4.	Replace T-4.

53. REPAIRMAN'S TROUBLE-SHOOTING CHART (TUBE TROUBLES).

Symptoms	Probable trouble*	Corrections
V-1: No voltage at pin 2.	Defective T-2.	Replace T-2.
V-1: No voltage at pin 3.	Defective T-1.	Replace T-1.
V-2: No voltage at pin 2.	Defective T-3.	Replace T-3.
V-2: No voltage at pin 3.	Defective T-2.	Replace T-2.

SECTION XII
REPAIRS

54. REPLACEMENT OF PARTS.

a. All the components of the equipment are readily accessible and may be easily replaced if they are found to be faulty.

b. When a defective component, such as a burned-out resistor or transformer is located, the cause of this may be in some other part of the circuit. For example, a shorted bypass capacitor may result in the burning out of a transformer which is located in a different component. This illustrates the point that, before a defective component is replaced, the fault which was responsible for the

*It is suggested that all troubles indicated by a lack of voltage be verified by making a resistance measurement and checking against the values given in figure 19.

components burning out (if outside the part itself) must be located. If this is not done the new part will be burned out in the same way as the one replaced.

55. REPLACEMENT PROCEDURES.

Careless replacement of parts often makes new faults inevitable. Note the following instructions:

a. Connections. Before a part is unsoldered, note the position of the leads. If the part, such as a transformer, has a number of connections to it, tag each lead.

b. Damage to Leads. Be careful not to damage other leads by pulling or pushing them out of the way.

c. Solder Drops. Do not allow drops of solder to fall into the set. They may cause short circuits.

d. Proper Soldering. A carelessly soldered connection may create a new fault. It is very important to make well soldered joints. A poorly soldered joint is one of the most difficult faults to find.

e. Amplifier Repair. Most of the repairs will be performed on the Amplifier AM-74. By unsnapping the trunk-type fasteners, the amplifier will slide from Case CY-314. All components are readily accessible and in most cases a component may be removed without disturbing another component.

f. Rustproofing and Repainting. All metal parts are bonderized and primed with a synthetic primer. Lustreless synthetic enamel is then applied. If rust appears on any parts, it should be cleaned off with cleaning fluid and sanded if necessary. All bare spots should be retouched with the enamel indicated above.

56. UNSATISFACTORY EQUIPMENT REPORT.

a. When trouble in equipment used by Army Ground Forces or Army Service Forces occurs more often than repair personnel feel is normal, War Department Unsatisfactory Equipment Report, W.D., A.G.O. Form No. 468 should be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C.

b. When trouble in equipment used by Army Air Forces occurs more often than repair personnel feel is normal, Army Air Forces Form No. 54 should be filled out and forwarded through channels.

c. If either form is not available, Form No. 468 (fig. 22) may

be reproduced, filled out, and forwarded through channels. When Army Air Forces Form No. 54 is required but unavailable, reproduce Form No. 468 and forward it through channels in accordance with directions on Form No. 468.

WAR DEPARTMENT
UNSATISFACTORY EQUIPMENT REPORT

FOR	TECHNICAL SERVICE: Signal Corps — MATÉRIEL		DATE: 1 July 1945
FROM	ORGANIZATION: 579 Signal Repair Co. APO 101		STATION: San Francisco, Cal
TO	NEXT SUPERIOR HEADQUARTERS: Signal Officer	STATION: Ninth Army	TECHNICAL SERVICE:

COMPLETE MAJOR ITEM

NOMENCLATURE: Public Add. Set AN/PIQ-1	TYPE: Portable Pub. Address		MODEL:
MANUFACTURER: Airoom Mfg. Co	U. S. A. REG. No.: Ordnance 29012-P-45	SERIAL No.: 312	DATE RECEIVED: 10 June 1945
EQUIPMENT WITH WHICH USED (*if applicable*)			

DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE

PART No.	TYPE: Vibrator	MANUFACTURER: Radiart Corp	DATE INSTALLED: 12 June 1945

DESCRIPTION OF FAILURE AND PROBABLE CAUSE (*If additional space is required, use back of form*): Fails to Vibrate - Burned out Coil

DATE OF INITIAL TROUBLE	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
19 June 1945			7				49		

BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN: Operated in temperature exceeding 110°

TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS (*If additional space is required, use back of form*)
POOR	FAIR	GOOD ✓	More durable Operating Coil

ORIGINATING OFFICER

TYPED NAME, GRADE, AND ORGANIZATION	SIGNATURE
HARMON A. HOWE Capt. Sig.C	Harmon A. Howe

FIRST ENDORSEMENT

TO CHIEF	TECHNICAL SERVICE: Signal Officer Washington	OFFICE: D.C.	
NAME, GRADE, AND STATION		STATION	DATE

Instructions

1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in matériel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.
2. This form will be used for reporting manufacturing, design, or operational defects in matériel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of matériel.
3. This form will not be used for reporting failures, isolated material defects or malfunctions of matériel resulting from fair-wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.
4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 750-10 (change No. 5).
5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.
6. When cases arise where it is necessary to communicate with a chief of service in order to assure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.
7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.
8. Necessity for using this form will be determined by the using or service troops.

W. D., A. G. O. Form No. 468
30 August 1944

This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.

TL96916

U. S. GOVERNMENT PRINTING OFFICE 16—41540-1

Figure 22. Unsatisfactory Equipment Report with sample entries.

APPENDIX

SECTION XIII

REFERENCES

57. PARTS LIST.

SIG 3 ..... List of Items for Troop Issue.
SIG 4-1 ..... Allowances of Expendable Supplies.
SIG 4-2 ..... Allowances of Expendable Supplies for Schools, Training Centers, and Boards.
SIG 5 ..... Stock List of All Items.

58. TEST EQUIPMENT.

TM 11-2626 ..... Test Unit I-176.
TM 11-2627 ..... Tube Tester I-177.

59. DECONTAMINATION.

TM 3-220 ..... Decontamination.

60. DEMOLITION.

FM 5-25 ..... Explosives and Demolitions.

61. CAMOUFLAGE.

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

62. OTHER TECHNICAL PUBLICATIONS.

FM 21-6 ..... List of Publications for Training.
TB SIG 66 ..... Winter Maintenance of Ground Signal Equipment.
TB SIG 72 ..... Tropical Maintenance of Ground Signal Equipment.
TB SIG 75 ..... Desert Maintenance of Ground Signal Equipment.
TM 1-455 ..... Electrical Fundamentals.
TM 11-462 ..... Reference Data.
TM 37-250 ..... Basic Maintenance Manual.

63. FORMS.

Army Air Forces Form No. 54 (Unsatisfactory Report).
W.D., A.G.O. Form No. 468 (Unsatisfactory Equipment Report).

SECTION XIV

MAINTENANCE PARTS

64. MAINTENANCE PARTS FOR PUBLIC ADDRESS SET AN/PIQ-1.

The following information was compiled on 12 May 1945. The appropriate pamphlet of the ASF Signal Supply Catalog for Public Address Set AN/PIQ-1 are:

SIG 7-AN/PIQ-1, Organizational Spare Parts (when published).

SIG 8-AN/PIQ-1, Higher Echelon Spare Parts (when published).

For an index of available catalog pamphlets, see the latest issue of ASF Signal Supply Catalog SIG 2.

Ref. symbol	Signal Corps stock No.	Name of part and description
	6C198-1	**PUBLIC ADDRESS SET AN/PIQ-1:** portable; output 1½ w; consists of horn type speaker on tripod; microphone and amplifier w/built-in battery and power supply.
	2C449-74	**AMPLIFIER AM-74/PIQ-1:** AF; 1½ w output; 8¼″ lg. x 2¼″ wd. x 4″ h.; Sig. C spec. #71-3163 (for repair parts see amplifier group).
BT501, 2, 3	3B275-206	**BATTERY BB-206U:** storage; portable; plastic container; 2 v.; 3¾″ h. x 2$\frac{11}{16}$″ lg. x 2⅛″ wd.; single cell, 11 amp. hr.; Willard type ER-11-2.
	3B4405-352	**BATTERY TRAY MT-352/PIQ-1:** metal; less batteries; approx. 4″ h. x 2¼″ wd. x 8″ lg.; w/metal strap to keep battery from shifting; Sig. C spec. #71-3163 (houses 3 batteries BB-206/U).
W201	1B3020-4.3	**CABLE, AF:** microphone; RC; ⅜″ OD; 4 #20 AWG stranded copper cond.; outer rubber sheath, filler and braided tinned copper shielding over conductors; Belden #8424.
	3E6000-560	**CABLE ASSEMBLY, power:** Army-Navy Cord CX-560/PIQ-1; rubber-jacketed; ¼″ OD; 10 ft. lg.; 2 #18 AWG copper cond. ea. comprising 41 #34 AWG strands; w/2 battery clips one end, male connector Amphenol #AN-3101-14S-7P other end; Sig. C spec. #71-684 (connects battery to battery charger.)

Ref. symbol	Signal Corps stock No.	Name of part and description
	3E6000-561	**CABLE ASSEMBLY, power:** Army-Navy Cord CX-561/PIQ-1; rubber-jacketed; ¼″ OD; 10 ft. lg.; 2 #18 AWG copper cond. ea. comprising 41 #34 AWG strands; w/2 battery clips one end, female connector Amphenol #AN-3106-14S-7S other end; Sig. C spec. #71-684 (connects amplifier to battery).
	2Z1587-284	**CLAMP:** cables; aluminum; satin finish; 2 bolts; $1\frac{5}{64}$″ lg. x $\frac{15}{16}$″ dia.; Amphenol #AN-3057-6.
E-402, 602	3Z1087-9	**CLIP, battery:** copper; 4¼″ lg. x $1\frac{9}{16}$″ wd. x ¾″ h. overall; stamped w/plus symbol; w/ copper lug; Mueller type #21.
E-401, 601	3Z1087-9.1	**CLIP, battery:** copper; 4¼″ lg. x $1\frac{9}{16}$″ wd. x ¾″ h. overall; stamped w/minus symbol; w/copper lug; Mueller type #21.
J-501	2Z3064-66	**CONNECTOR, female contact:** 3-round cont.; 90° angle; 1¾″ lg. x $1\frac{1}{16}$″ diam. overall; Amphenol #AN-3108-14S-7S (p/o Battery Tray MT-352/PIQ-1).
J-401	2Z3064-9	**CONNECTOR, female contact:** 3-round cont.; straight; $1\frac{11}{32}$″ lg. x $1\frac{1}{16}$″ diam.; Amphenol #AN-3106-14S-7S (p/o Cord CX-561/PIQ-1).
J-301	2Z3066-6S	**CONNECTOR, female contact:** 5-round cont.; straight; $1\frac{11}{32}$″ lg. x 0.906″ diam.; Amphenol #AN-3101-14S-5S (p/o Cord CX-562/PIQ-1).
P-601	2Z3023-30	**CONNECTOR, male contact:** 3-round cont.; straight; $1\frac{11}{32}$″ lg. x 0.906 diam.; Amphenol 1 #AN-3101-14S-7P (p/o Cord CX-560/PIQ-1).
P-101, 201, 301	2ZK7115.4	**CONNECTOR, male contact:** 5-round cont.; straight; $1\frac{11}{32}$″ lg. x $1\frac{1}{16}$″ diam. overall; Amphenol #AN-3106-14S-5P (p/o Microphone M-8/PIQ-1, Cord CX-563/-PIQ-1 and Cord CX-562/PIQ-1).
	3E6000-562	**CORD CX-562/PIQ-1:** microphone extension; RC; 25 ft. lg.; 4 #18-strand cond.; w/Amphenol #AN-3106-14S-5P male connector and cable clamp, Amphenol #AN-3101-14S-6S female connector other end; Sig. C spec. #71-4945.
	3E6000-563	**CORD CX-563/PIQ-1:** microphone; RC; 12″ lg.; 4 #18-strand con. w/Amphenol #AN-3106-14S-5P one end, metal box containing Jacks JK-33-A and JK-34-A other end; Sig. C spec. #71-4945 (microphone to amplifier).

Ref. symbol	Signal Corps stock No.	Name of part and description
	6C17-2	**DRIVER UNIT, speaker:** diaphragm type; PM; output 1.3 w normal, 2.4 w peak; voice coil impedance 15 ohms; 2″ diam. x 2¼″ h overall; blast-proof; Racon Elec. REDOW-BPX (p/o LS-110/PIQ-1).
	6C27-4	**HORN, speaker:** aluminum black lacquer; 8$\frac{13}{16}$″ lg. x 4$\frac{5}{16}$″ diam. bell w/rolled edge; ⅞″ –18x⅝″ lg. female fitting; Racon Elec. #5HO85R (p/o LS-110/PIQ-1).
	6C29	**HOUSING, speaker unit:** aluminum; 3¼″ diam. x 1¾″ h body dimen.; w/2 brass #12-24 binding posts 2¼″ C to C; Racon Elec. #DW Box.
E-604, 404	3G1790-80.1	**INSULATOR, clip:** rubber cone; black; 5″ lg. x 1⅜″ ID large end x ½″ ID small end; Mueller type #23 (p/o Cords CX-560/PIQ-1 and CX-561/PIQ-1).
E603, 403	3G1790-80	**INSULATOR, clip:** rubber cone; red; 5″ lg. x 1⅜″ ID large end x ½″ ID small end; Mueller #23 (p/o Cords CX-560/PIQ-1 and CX-561/PIQ-1).
J201A	2Z5533A	**JACK JK-33-A:** telephone; for 3-cond. 0.205″ diam. plug; 1¼″ lg. x ⅞″ diam. overall; Sig. C dwg. #SC-D-2339-1 and #SC-D-2332-5.
J201B	2Z5534A	**JACK JK-34-A:** telephone; for 2-cond. 0.25″ diam. plug; 1¼″ lg. x 1″ wd. x ¾″ h.; Sig. C spec. #71-852.
	2B1657-8	**MICROPHONE M-8/PIQ-1:** carbon; hand type; consists of Sig. C Microphone Unit MC-419 in handle w/switch 36″ cord to handle w/plug for attaching to amplifier; Sig. C spec. #71-3163.
	6C42-110	**SPEAKER, dynamic:** Army-Navy Loudspeaker LS-110/PIQ-1; PM; includes trumpet, 2 binding posts and mtg. hardware; 13½″ lg. x 5″ trumpet end x 3½″ housing end; S C spec. #71-3163.
	2Z9964-102	**TRANSFORMER TF-102/PIQ-1:** AF; line matching; pri. 250 ohms, seed 15 ohms; fully inclosed steel cases; 4″ h. x 4″ wd. x 3″ lg.; Sig. C spec. #71-3163.
	6C335-353	**TRIPOD MT-353/PIQ-1:** loudspeaker; metal; collapsible; legs; 17$\frac{5}{16}$″ lg. x 1⅝″ diam. closed; Sig. C spec. #71-3163.
		AMPLIFIER GROUP
H3, 4	2Z1605-33	**CAP:** connector; aluminum; olive drab; $\frac{7}{16}$″ lg. x 1″ OD; ⅞″ –20 female thd.; w/2½″ chain and washer; Amphenol #AN-9760-14P; AAC #A-62431-14.

Ref. symbol	Signal Corps stock No.	Name of part and description
C3A, 3B	3DB10-139	**CAPACITOR, fixed:** electrolytic; two sect.; 10-10mf; 200 vdcw; 2½″ lg. x 1″ diam.; Sprague Special; AAC #A-71023-3; Sprague #4538.
C1A, 1B	3DB120-1	**CAPACITOR, fixed:** electrolytic; two sect.; 12-120 mf; 6 vdcw; 2½″ lg. x 1″ diam.; Sprague Special; AAC #A-71023-2; Sprague #4537.
C2	3DB400-2	**CAPACITOR, fixed:** electrolytic; 400 mf; 6 vdcw; 2½″ lg. x 1″ diam.; Sprague Special; AAC #A-71023-1; Sprague #4539.
C4	3DA20-153	**CAPACITOR, fixed:** paper; 20,000 mmf ± 10%; 600 vdcw; max. body dimen. 1 17/32″ lg. x 17/32″ diam.; CP27-A1EF203K.
C5	3DA50-215	**CAPACITOR, fixed:** paper; 50,000 mmf ± 10%; 400 vdcw; max. body dimen. 1 9/32″ lg. x 23/32″ diam.; CP27-A1EE503K.
J1	2ZK7409-20	**CONNECTOR, female contact:** 5-round cont.; straight; 1 3/16″ sq. x 29/32″ lg. body; Amphenol #AN-3102-14S-5S.
P1	2Z3023-5	**CONNECTOR, male contact:** 3-round cont.; straight; 1 3/16″ sq. x 29/32″ lg. body; Amphenol #AN-3102-14S-7P.
	2ZK5822-23	**KNOB, round:** black plastic; for ¼″ diam. shaft; single #8-32 setscrew w/screwdriver slot; 9/16″ h. x ¾″ diam.; Kutz-Kasch #S-230-1; AAC #A-70537-1.
H1, 2	3Z737-40	**POST, binding:** push type; 1 5/32″ lg. x 39/64″ diam., mtg. stem ⅜″ lg. x #12-24 thd.; Eby. #76V, AAC #A-76001-1.
R1	3RC21BF200J	**RESISTOR, fixed:** composition; 20 ohms ± 5%; ½w; max. body dimen. 0.655″ lg. x 0.249″ diam.; RC21BF-200J.
R3	3RC21BF750J	**RESISTOR, fixed:** composition; 75 ohms ± 5%; ½ w; max. body dimen 0.655″ lg. x 0.249″ diam.; RC21BF750J.
R4	3RC21BF910J	**RESISTOR, fixed:** composition; 91 ohms ± 5%; ½ w; max. body dimen. 0.655″ lg. x 0.249″ diam.; RC21BF910J.
R2	2Z7271.32	**RESISTOR, variable (potentiometer):** carbon; 100,000 ohms ± 20%; 1 w; 1.227″ diam. x 9/16″ thk.; shaft ¼″ diam. x ¾″ lg.; mtg. bushing ⅜″ -32x⅜″ lg.; AAC #A-71306-16.

Ref. symbol	Signal Corps stock No.	Name of part and description
	2Z8304.58	**SHIELD, tube:** steel; round, open top; bayonet mtd.; $\frac{13}{16}$″ ID, $1\frac{3}{4}$″ h. x $\frac{7}{8}$″ OD; Eby #7797.
X1, 2	2Z8677.101	**SOCKET, tube:** miniature; plastic; max. dimen. 0.805″ diam. x $1\frac{19}{64}$″ lg.; S010M.
J2	2Z8676.87	**SOCKET, tube:** 6-round conts.; straight; $1\frac{1}{8}$″ diam. x $\frac{1}{2}$″ h.; Franklin AW type #25A8 (for vibrator).
T2	2Z9636.91	**TRANSFORMER, AF:** interstage; pri. 10,000 ohms, secd. 6,400 ohms. CT; metal can; $1\frac{27}{64}$″ lg. x $\frac{7}{8}$″ diam.; UTC #82837; AAC #A-101536-1; Sig. C. spec. #71-4942.
T1	2Z9631.279	**TRANSFORMER, AF:** microphone; pri. 100 ohms, secd. 4,600 ohm metal case; $1\frac{27}{64}$″ lg. x $\frac{7}{8}$″ diam.; UTC #82836; AAC #A-101536-1; Sig. C spec. #71-4942.
T3	2Z9632.394	**TRANSFORMER, AF:** output; pri. 10,000 ohms CT, secd. (4 and 6) 15 ohms, (4 and 6) 50 ohms, (4 and 7) 250 ohms; metal can; $2\frac{1}{4}$″ lg. x $1\frac{9}{16}$″ diam.; UTC #82835; AAC #A-101537-1; Sig. C spec. #71-4942.
T4	2Z9625-45	**TRANSFORMER, power:** vibrator; pri. 6 and 8 w/7 as CT, 1 and 7 choke, 1.6 amp.; secd. 2 and 4 w/3 as CT, 3 and 5 choke, 30 ma; metal case; $2\frac{7}{8}$″ lg. x $2\frac{3}{16}$″ diam.; UTC #82834; AAC #A-101534-1; Sig. C spec. #71-4942.
V1, 2	2J3A5	**TUBE, electron:** JAN3A5.
E1	3H6694-26	**VIBRATOR, synchronous:** input 6 v., 1.5 amps.; tubular aluminum case; $2\frac{1}{2}$″ lg. x $1\frac{1}{8}$″ diam.; std. base; Radiart #VR-2; AAC #A-75550-1.

Order No. 29012-P-45-08; 29,318 copies; date printed 18 May 1945.