TM 11-2504

WAR DEPARTMENT TECHNICAL MANUAL

PUBLIC ADDRESS SETS PA-5 AND PA-5-A

WAR DEPARTMENT . 24 DECEMBER 1943

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 24 December 1943.

TM 11–2504, Public Address Sets PA-5 and PA-5-A, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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The Adjutant General.

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

TECHNICAL MANUAL

PUBLIC ADDRESS SETS PA-5 AND PA-5-A

CHANGES No. 1 } U.S. WAR DEPARTMENT, WASHINGTON 25, D. C., 27 June 1945

TM 11-2504, 24 December 1943, is changed as follows:

On figure 14, change designation Cord CD-1079 to read: Cord CD-1080. Change designation Cord CD-1080 to read: Cord CD-1079.

26. INSTALLATION AND OPERATION ON ALTERNATING CURRENT WITH SPEAKERS MOUNTED ON CHEST CH-229.

* * * * * * *

b. Connections (See fig. 14). (1) Place the plug of Cord **CD-1080** in the connector on the front of the amplifier and record player.

* * * * * * *

28. BATTERY OPERATION, SPEAKERS MOUNTED ON CHEST CH-229.

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b. Connections (See fig. 14). (1) Place the plug of Cord **CD-1079** into the connector on the front panel of the amplifier and record player.

* * * * * * *

(4) Proceed as described in paragraph 26*b* (2) through (4).

* * * * * * *

30.1. PURPOSE AND USE OF EQUIPMENT PERFORMANCE CHECK LIST (Added).

a. General. The equipment performance check list (par. 30.2) will help the operator to determine whether the public address set is functioning properly. The check list gives the item to be checked, the action to be taken to check the item, the normal indications, and the corrective measures that the operator can take. Items which are to be checked preparatory to operation, when starting the equipment, during operation, and when stopping the equipment are given in the check list.

b. Action. Information given in the action column represents an action that must be taken in order to check the normal indications given in the normal indications column.

c. Normal indications. The normal indications listed include the visible and audible signs that the operator will perceive when he checks the items listed. If the indications are not normal, the operator should apply the recommended corrective measures.

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d. Corrective measures. The corrective measures listed are those that the operator can make without turning the equipment in for repairs. References in the table to paragraphs 39 through 41 indicate that the correction of the trouble cannot be effected during operation and that trouble shooting by an experienced repairman is called for. If the set is completely inoperative, or if recommended corrective measures do not yield results, trouble shooting is necessary. However, if the tactical situation requires that operation be continued and if the set is not completely inoperative, the operator must maintain the set in operation as long as it is possible to do so.

30.2. EQUIPMENT PERFORMANCE CHECK LIST (Added).

a. A-c Operation using microphone.

	Item No.	Item	Action	Normal indication	Corrective measures
PREPARATORY	1	Cord CD–1080	Plug into amplifier connector S–14 (fig. 2).	Pins make firm contact and slip into connector easily.	If cord connector does not enter, reverse 180° and reinsert.
	2	Cords CD–1078	Plug male connectors on cords into female connectors S–15 and S–16 (fig. 2).	----------	
	3	Cords CD–1078	Plug opposite ends of both cords into speaker receptacles (fig. 12).	----------	
	4	Cords CD–1077	Connect one end to connector S–10 (fig. 2) and other end to microphone (fig. 5).	----------	
	5	MASTER switch	Throw to OFF	----------	
	6	TURNTABLE switch	Throw to OFF	----------	
	7	Cord CD–1075	Plug female connector into switch panel a-c connector. Plug male connector into 110-volt, 60-cycle, a-c external power source.	----------	
	8	OPERATE CHARGE switch on switch panel (fig. 4).	Throw to OPERATE	Charger inoperative. 110-volt a-c now available to operate amplifier.	Check a-c fuse in switch panel.
	9	PHONOGRAPH volume control knob.	Turn to 0	----------	
	10	MICROPHONE volume control knob.	Turn to 0	----------	
	11	TONE control knob	Turn to TREBLE	----------	

a. A-c Operation using microphone—Continued.

	Item No.	Item	Action	Normal indication	Corrective measures
START	12	MASTER switch	Throw to ON	Pilot lamp on	Check a-c fuse on switch panel. Replace pilot light. Check tubes, Cord CD–1080, and power source.
	13	Microphone switch	Push to On	White dot on switch appears.	
	14	MICROPHONE volume control knob.	Turn clockwise while tapping the microphone. Stop turning knob when sound is heard.	Slight hiss from loudspeakers. Reproduction of voice when speaking into microphone.	See paragraphs 39 through 41.
EQUIPMENT PERFORMANCE	15	Microphone operation	Feedback when microphone is in certain positions.	Howling sound diminishing and rising when microphone is moved in relation to loudspeakers.	See paragraph 26c.
STOP	16	MASTER switch	Throw to OFF	Pilot lamp off; speaking into microphone produces no sound.	
	17	MICROPHONE, TONE, and PHONOGRAPH control knobs.	Turn all control knobs to extreme counterclockwise position.		

b. A-c Operation using record player.

	Item No.	Item	Action	Normal indication	Corrective measures
PREPARATORY	18	See items 1 to 11			
	19	Microphone switch	Turn to OFF position		
	20	Pick-up arm	Loosen knurled nut on guard bracket.		
	21	Needle	Loosen needle-locking screw. Insert needle, lock needle in position.		
	22	Turntable speed preselector lever (fig. 2).	Set to desired speed.	Pointer on either 78 or 33⅓ r. p. m. setting.	If lever is jammed, check for obstruction at governor end of turntable motor. Check tightness of lever clamp screw.
START	23	MASTER switch	Throw to ON	Pilot lamp on	Check a-c fuse on switch panel, a-c power source, and Cord CD–1080.
	24	TURNTABLE power switch.	Throw to ON	Turntable rotates at selected speed.	Check Socket S–7, switch SW–2, (fig. 16), taps 11, and 13 on connector S–14, a-c fuse on switch panel, and source of a-c power.
	25	PHONOGRAPH volume control knob (fig. 2.)	Turn clockwise	Slight hum or amplifier hiss from speakers. Reproduction of record with good fidelity.	Consult paragraphs 39 through 41. Check needles. Check turntable speed with stroboscope disk.
STOP	26	See items 16 and 17			

c. *Battery operation with microphone.*

	Item No.	Item	Action	Normal indication	Corrective measures
PREPARATORY	27	Cord CD–1079	Plug into amplifier connector S–14 (fig. 2).	Pins make firm contact and slip into connector easily.	If plug does not enter, reverse 180° and reinsert.
	28	Cord CD–1081	Plug into battery connector on switch panel (figs. 4 and 14).		
	29	See items 2, 3, 4, 5, 6, 8, 9, 10, and 11.			
START	30	MASTER switch	Throw to ON	Pilot lamp on; vibrator VIB 1 buzzes.	Consult paragraphs 39 through 41. Check battery with hydrometer, recharge if necessary; use spare battery.
	31	See items 13 and 14			
EQUIPMENT PERFORMANCE	32	See item 15			
STOP	33	See items 16 and 17*			

*In addition to the normal indications given for item 16, the vibrator VIB 1 stops buzzing when the MASTER switch is thrown to OFF.

d. Battery operation with record player.

	Item No.	Item	Action	Normal indication	Corrective measures
PREPARATORY	34	See items 27, 28, 2, 3, 5, 6, 8, 9, 10, and 11.	----------	----------	
	35	See items 19, 20, 21, and 22	----------	----------	
START	36	MASTER switch	Throw to ON	Pilot lamp on; vibrator VIB 1 buzzes.	See item 30.
	37	TURNTABLE power switch (fig. 2).	Throw to ON	Vibrator VIB 2 buzzes; turntable rotates at selected speed.	If vibrator does not buzz, check battery voltage, a-c fuse, taps 10, 1, and 7 on connector S–14 for open or cold solder connections. Consult paragraphs 39 through 41.
	38	See item 25	----------	----------	
STOP	39	See items 16 and 17*	----------	----------	

*In addition to the normal indications given for item 16, vibrators VIB 1 and VIB 2 stop buzzing when the MASTER switch is thrown to OFF.

38. TROUBLE LOCATION AND REMEDY.

a. Battery (Superseded). Before placing battery in service, read carefully the instructions attached to the battery for installation and care. For best operating results, keep the battery fully charged. It may however be operated until completely discharged provided it is immediately recharged. Overdischarging, as a constant practice, will soon result in permanent damage. Persistent overcharging on the other hand will also tend to damage the battery.

* * * * * * *

c. Charging the battery (See fig. 19) (Superseded). Before charging, disconnect the battery Cord CD–1081 and remove the battery from Chest CH–229. To charge the battery, proceed as follows:

(1) Remove battery vent caps.

(2) Attach battery clip (marked +) on Cord CD–1076 to battery terminal (marked +). Attach the unmarked battery clip on Cord CD–1076 to battery terminal (marked −).

(3) Insert the female connector on Cord CD–1076 in the BATTERY connector on the switch panel and twist to lock in place.

(4) Insert the female connector on the a-c extension Cord CD–1075 in the a-c connector on the switch panel.

(5) Connect the male connector on Cord CD–1075 to an external source of 110- to 117-volt, 60-cycle, alternating current.

(6) Place switch on the switch panel in CHARGE position.

(7) Check ammeter on Rectifier RA–103. The needle should be in *green* (charge) segment of scale. If needle registers in *red* (danger) segment turn the switch to OPERATE position, as this indicates an excessive charging rate which will damage the battery. An excessive charging rate is generally caused by a defective battery.

(8) Continue charging until hydrometer check of electrolyte shows specific gravity of 1.280 to 1.300.

(9) When the battery is fully charged, disconnect Cord CD–1075 from the external a-c source, remove the clips on Cord-1076 from the battery, replace the battery vent caps, return the battery to its original position in Chest CH–229, and reconnect the battery Cord CD–1081.

WARNING: Always disconnect Cord CD–1075 from the 60-cycle, a-c source before removing clips on Cord CD–1076 from battery. A spark caused by the disconnection of the battery clips, while the charge is still connected to the a-c source, may cause an explosion.

(10) Place the switch on the switch panel in the OPERATE position.

41.1. UNSATISFACTORY EQUIPMENT REPORT (Added).

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 (WD

AGO Form 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 54 (Unsatisfactory Report) should be filled out and forwarded through channels.

42. MEANING OF PREVENTIVE MAINTENANCE (Added). 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 primary function of preventive maintenance is to *prevent* break-downs and, therefore, the need for repair. The primary function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. An entire public address set's operation depends upon each part being at peak operating efficiency. It is vitally important that operators and repairmen maintain their public address sets properly.

43. DESCRIPTION OF PREVENTIVE MAINTENANCE TECHNIQUES (Added).

a. General. Most of the electrical parts used in Public Address Sets PA–5 and PA–5–A 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. The following paragraphs contain the specific instructions and serve as a guide for personnel assigned to perform the six basic maintenance operations: Feel, Inspect, Tighten, Clean, Adjust, 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 needs. For example, the dust encountered on dirt roads during cross- country travel filters into the equipment no matter haw much care is taken to prevent it. Rapid changes 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. Feel. The feel operation is used most often to check the turntable motor, and to determine whether electrical connections, transformers, etc., are overheated. Feeling indicates the need for lubrication or the existence of similar types of defects requiring correction. The maintenance man must become familiar with the normal operating temperatures of the motor, etc., in order to recognize signs of overheating.

NOTE: It is important that the feel operation be performed as soon as possible after shut-down and always before any other maintenance is done.

c. Inspect. Inspection is the most important operation in the preventive maintenance program. A careless observer will overlook the evidences 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 breakdowns. 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 surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

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

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

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

d. Tighten, Clean, and Adjust. These operations are self-explanatory. Specific procedures to be followed in performing them are given wherever necessary throughout the following paragraphs.

CAUTION: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

e. Lubricate. Lubrication refers to the application of oil to the bearings of the phonograph motor. It also means the application of a light oil to hinges or other sliding surfaces on the chests.

44. VACUUM TUBES (Added).

NOTE: Avoid working on the tubes immediately after shut-down. Severe burns may result from contact with the envelopes of hot tubes.

a. Inspect (I). (1) Inspect glass and metal tube envelopes for accumulation of dirt and for corrosion. Replace tubes which have loose envelopes.

(2) Inspect the firmness of 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 spreads the socket contacts. It is desirable to inspect the sockets of the tubes at the time the tubes are checked.

b. Adjust (A). Adjust all poor-fitting tube clips. Do not flatten the tube clip during adjustment. A flattened clip does not make adequate contact with the surface of the tube base. Adjust by gently compressing the clip upward with the fingers. If the tube clip is made of heavy gauge metal, adjust with a pair of long-nose pliers.

c. Clean (C). (1) Clean the tubes only if inspection shows cleaning to be necessary. Remove dust and dirt from the glass or metal envelopes with a clean, lint-free, dry cloth.

(2) Clean the tube contacts with fine sandpaper. Remove all dirt, corrosion, and oxidation.

45. CAPACITORS (Added).

a. Inspect (I). (1) Inspect the terminals of the capacitors for corrosion and loose connections. Carefully inspect the mountings for loose mounting screws.

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

b. Tighten (T). Tighten loose terminals, mountings, and connections on the capacitors, when necessary.

c. Clean (C). Clean the cases of all capacitors, and all connections that are dirty or corroded. The capacitor cases can usually be cleaned with a dry cloth. However, if the deposit of dirt is hard to remove, moisten the cloth in Solvent, Dry Cleaning, Federal Spec. No. P–S–661a (Amend 1) (SD).

46. RESISTORS (Added).

a. Inspect (I). Examine the bodies of all types of resistors for blistering, discoloration, and other indications of overheating. Inspect leads and all other connections for corrosion, dirt, dust, and looseness. Check the security of all mountings. Move resistors with pigtail connections only when necessary. Connections break off if resistors are moved excessively.

b. Tighten (T). Tighten all loose resistor connections and mountings.

c. Clean (C). Clean all resistors with a small brush. Discoloration caused by overheating or overload cannot be removed.

47. FUSES (Added).

a. General. Three glass-cased fuses are used in Public Address Set PA–5 and PA–5–A. Throw away any blown fuses. The fuses are easily removed for inspection. See that the fuse ends and holding clips are kept clean and tight. If they are not, arcing and burning may occur and make replacement of the complete holder necessary.

b. Inspect (I). Inspect the fuse caps for evidence of burning, charring, and corrosion; the fuse clips for dirt, loose connections, and proper tension.

c. Tighten (T). The tension of the fuse clips may be increased by pressing the sides closer together. If necessary, use a pair of pliers to adjust the tension.

d. Clean (C). Clean fuse ends and fuse clips with sandpaper; wipe them with a clean cloth. When using a file to remove deep pits on the clips, fuse ends, or contacts, always finish up with sandpaper in order to leave a smooth contact surface. As a final step, wipe the surface with a clean, dry cloth.

48. SWITCHES (Added).

a. Inspect (I). With the power off, inspect the mechanical action of each switch, and, while so doing, look for signs of dirt or corrosion on all exposed elements. In some cases, it will be necessary to examine the elements of the switch visually; in others, check the action of the switch by flipping the control knob or toggle, and note the freedom of movement and amount of spring tension.

b. Clean (C). Clean the exterior surfaces of switches with a clean cloth.

49. POTENTIOMETERS (Added).

a. Inspect (I). (1) Inspect the mechanical condition of the potentiometers. The shaft should turn easily in the bushing which supports it.

(2) Inspect the assembly and mounting nuts.

(3) Examine the insulating body of the potentiometer for dust, dirt, cracks, and chipped places.

(4) Examine all metallic parts for dust, dirt, and corrosion.

b. Tighten (T). Tighten loose mounting nuts.

c. Clean (C). (1) Clean all exposed contact surfaces and connections.

(2) Remove grease and dirt from potentiometer parts with dry-cleaning solvent (SD).

(3) Clean the body of the potentiometer with a brush or cloth.

50. CONNECTORS (Added).

a. Inspect (I). Inspect the female end of the connectors for corrosion and collected dust. Inspect the mountings for cracks and loose connections. Inspect the male ends for loose, corroded, and broken pins.

b. Clean (C). Clean the male and female ends of the connectors with a brush moistened in dry-cleaning solvent (SD). Remove corrosion with #0000 sandpaper then wipe with a clean cloth.

51. CORDS AND CABLES (Added). The cables in public address sets are the life lines of the equipment. Condition of the cabling must be closely observed. Equipment operated in all kinds of weather, and moved on all kinds of roads subjects the cabling to excessive punishment.

a. Inspect (I). Inspect the cables for cracked or deteriorated insulation, frayed or cut insulation at the connecting and supporting points. Also watch for kinks and improper supports.

b. Tighten (T). Tighten loose cable clamps, coupling links, and cable connections.

c. Clean (C). Clean connectors and cables when they are dirty or corroded. Clean corroded connectors with #0000 sandpaper. It is important that the entire surface of the connector be clean. No attempt should be made to remove individual prongs from the cable connectors.

52. PILOT LIGHT (Added). The pilot light is used to indicate when power has been applied to the circuit. The pilot light is easily removed and replaced.

a. Inspect (I). Inspect the pilot light assembly for a loose lamp, loose mounting screws, and loose, dirty, or corroded connections.

b. Tighten (T). Tighten loose mounting screws and resolder any loose connections. If the connections are dirty or corroded, they should be cleaned before soldering.

53. CHESTS (Added).

a. Inspect (I). Inspect the outside and inside of each chest thoroughly. Check for flaky paint, a warped cover, and loose hardware.

b. Clean (C). Clean each chest, outside and in, with a clean, dry cloth. Use dry compressed air to blow out all accumulated dirt and dust. Repaint any surface that is found scratched, rusted, or chipped.

c. Tighten (T). Tighten all hardware.

54. MICROPHONE AND LOUDSPEAKERS (Added): These auxiliary items of equipment are essential to the operation of the

public address set. Therefore, care must be exercised when performing preventive maintenance.

a. Inspect (I). Inspect all external surfaces for dirt and corrosion. See that all cable connections are tight and that connectors fit together properly.

b. Clean (C). Clean with low-pressure compressed air directed at the stronger portions of the assemblies. Use a clean cloth free from lint and filings to remove surface dust and dirt.

55. PHONOGRAPH TURNTABLE, MOTOR, AND CRYSTAL PICK-UP (Added).

a. Inspect (I). Inspect the external surfaces for dirt and corrosion.

b. Clean (C). Clean all the external parts of the turntable and motor.

c. Tighten (T). Tighten the mounting screws of the turntable and motor.

d. Lubricate (L). Once every 3 months place a few drops of Oil, Lubricating, Preservative, Special, U. S. Army Spec. No. 2–120 (PS), into the three oiling holes located on top of the phonograph motor. One hole is ball-spring covered, and the other two are conventional oil ducts. If all the oil ducts are not accessible, remove motor from amplifier cover by removing the three motor mounting screws and releasing the motor from the cover. Apply oil and replace the motor.

56. INTRODUCTION TO ITEMIZED PREVENTIVE MAINTENANCE (Added). For ease and efficiency of performance, preventive maintenance on Public Address Sets PA–5 and PA–5–A is broken down into operations that can be performed at different time intervals. In the following paragraphs, the preventive maintenance work to be performed on the equipment at specified time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations on individual parts are discussed in paragraphs 43 to 55. These general instructions are not repeated in the itemized maintenance text which follows. Therefore, when performing maintenance, refer to these paragraphs as required. 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 will be put into operation and check for satisfactory performance (see par. 65).

57. COMMON MATERIALS NEEDED (Added).

The following materials will be needed in performing preventive maintenance:

Brush, 1-inch, for cleaning purposes
Cloth, dry, lintless

Oil, (PS), in a squirt can
Pliers, long-nose
#0000 sandpaper
Screw driver, 2½-inch
Screw driver, 8-inch
Soldering iron, 100-watts
Solder, rosin-core
Solvent, dry-cleaning (SD)

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 when necessary 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 and key contacts, plugs, commutators, etc.

58. ITEM 1, AMPLIFIER AND ACCESSORY CHEST CH–229 (fig. 1) (Added).

OPERATIONS:

ITCL Cabinet and hardware
IC Reels RL–55 (fig. 7)
ITC Rectifier RA–103 (fig. 6)
IC Switch panel
IC Contents list and circuit label
ITCL Trunk latches and hinges
IC Storage battery (par. 38), and hydrometer (fig. 6)
IC Tops and legs for Stands M–405 (fig. 15)
IC Spare parts (fig. 9), and cords (figs. 5, 7, and 8)

REMARKS: When the above operations are completed, check all wiring and connectors to see that they are left in their original positions. If the battery was on charge prior to the inspection, see that the chest cover is open to allow the battery fumes and acid spray to dissipate in the free air. Item 1 is intended to direct an over-all examination of the chest contents. Consult the list of components and figure 9 for a complete description of the chest contents. Descriptions of the spare parts shown in figure 9 can be found by referring to the asterisked symbols in the Ref. No. column, paragraph 69.

59. ITEM 2, CHEST CH–230–(*) AND LOUDSPEAKER LS–12–(*) (figs. 10 and 11) (Added).

PRELIMINARY STEPS: Remove the two loudspeakers from the chest and place in a clean, dry place.

OPERATIONS:

ITCL Chest and hardware
IC Loudspeakers and receptacles S 19 to S 22, inclusive

REMARKS: The loudspeakers are of the permanent magnet type using a very powerful field magnet. Avoid the use of cleaning cloths containing metallic particles of iron or steel or alloys of both. Remove wrist watch when near the loudspeakers. The intense magnetic field surrounding the speaker may magnetize the watch and affect its efficiency.

60. ITEM 3, BATTERY BOX BX–59 AND SPARE BATTERY (fig. 3) (Added).

PRELIMINARY STEPS: Remove the spare battery from its box and place it on a clean piece of paper.

OPERATIONS:

ITCL	Battery box and hardware. Use an acid neutralizing solution for cleaning the inside of the box
IC	Battery

REMARKS: Consult paragraph 38 a and b for battery testing and charging information. For a more complete and detailed discussion of the storage battery, see TM 11–430.

61. ITEM 4, AMPLIFIER AND RECORD PLAYER BC–1292 (Added).

PRELIMINARY STEPS: Remove the four or six screws (Public Address Set PA–5–A chassis is secured with four mounting screws) holding the amplifier to the chest base and after disconnecting attached cables or plugs, lift up and out of the chest. Lift off the turntable, lock the phonograph pick-up to the bracket and remove the needle. Remove the four screws holding the amplifier cover and lift the cover until the internal parts are exposed. Disconnect the phonograph motor plug from the socket S–7 (fig. 16), and the phonograph pick-up lead and plug from the socket S–25. Remove the bottom plate from the amplifier chassis and proceed with the operations.

OPERATIONS:

FITC	Transformers, especially T–1 (fig. 16)
ITC	Capacitors, tubular and can type. Check oil-filled C–10 carefully
IC	Resistors, check mountings of R–1 and R–2 (fig. 18)
ITCA	Sockets, vibrator, and tube
I	Wiring and shield on phonograph pick-up wire
ITC	Knobs, setscrews, bushings, and hexagon holding nuts
FITCL	Phonograph motor. See paragraph 55 for lubrication data
IC	Tubes including pilot lamp, and ground contact on tube V–1

ITC Switches (master and turntable power switches S–1, and S–2)
IC Entire chassis and chest space beneath chassis

REMARKS: When checking the wiring, pay particular attention to poor soldering on the connections to the 15-pole male receptacle S–14. Look for pieces of solder which may be lodged between the lugs. Check for corrosion and bent pins.

62. ITEM 5, SWITCH PANEL AND RECTIFIER RA–103 (figs. 4 and 6) (Added).
OPERATIONS:

FITC Rectifier housing and wiring
ITC Switch panel
ITC Underneath switch panel
IC Fuses F–1, 2, and 3

REMARKS: Check connections of the rectifier a-c input and d-c output wires to the under side of the switch panel and the two receptacles on top of the switch panel for corrosion. These checks are important, as battery spray and fumes emanating from a gasing battery will attack the metallic parts and corrode them. Be sure to replace fuses with those of the same rating. Fuses F–2 and F–3 are used in the 6-volt circuits; fuse F–1 is used only in the 110-volt, a-c circuit (fig. 19).

63. ITEM 6, MICROPHONE T–55, AND CRYSTAL PICK-UP (Added).
OPERATIONS:

IC Microphone and bracket
IT Crystal pick-up

REMARKS: Do not disassemble the microphone and crystal pick-up for cleaning or inspection. To IC the microphone is to inspect the exterior and wipe it with a clean cloth free from metallic particles. The crystal pick-up is not to be removed from the pick arm for cleaning. The inspection and tightening should be confined to the mounting hardware only. Handle the microphone and pick-up arm gently and only when necessary. Do not drop the pick-up arm on the turntable.

64. ITEM 7, CORDS, CABLES, AND CONNECTORS (Added).
PREPARATORY STEPS: Remove all the cables and reels from the chest and place in the open air for inspection. Keep the receptacles and connectors off the ground and away from much-traveled paths.
OPERATIONS:

ITCA Connectors, plugs, receptacles
IC Cords

REMARKS: Preventive maintenance on the cords and their terminals should be done on unscheduled operating days if possible. The preventive maintenance check list schedules the ITCA of cords and their associated connectors once every 2 weeks. Local conditions and the availability of alternating current should be considered when attempting to schedule maintenance operations on these parts.

65. PREVENTIVE MAINTENANCE CHECK LIST (Added).

a. Description of check list. The following check list is a summary of the preventive maintenance operations to be performed on Public Address Sets PA–5 and PA–5–A. The suggested time intervals shown on the check list may be varied at any time by the local commander. However, for best performance of the equipment, the operations will be performed at least as frequently as called for in the check list. The echelon column indicates which operations are considered first echelon maintenance and which operations are considered 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).

b. Preventive maintenance check list.

Item No.	Operations	Item	When performed			Echelon*
			Before operations	Every 2 weeks	Every 3 months	
1	I	Chest CH–229 and contents	x			1st.
1	IC	Chest CH–229 and contents		x		1st.
2	IC	Chest CH–230 and contents		x		1st.
3	IC	Spare battery and battery box		x		1st.
4	FITC	Amplifier and Record Player BC–1292		x		2d.
5	FITC	Rectifier RA–103		x		1st.
5	IC	Switch panel and fuses		x		1st.
7	ITCA	Connectors, plugs, and receptacles		x		2d.
7	IC	Cords		x		2d.
1	ITCL	Chest CH–229 and contents			x	1st.
2	ICTL	Chest CH–230			x	1st.
3	ITCL	Battery box			x	1st.
4	FITCL	Phonograph motor M–1 (par. 55)			x	2d.
5	ITC	Switch panel (underneath)			x	1st.
6	IC	Microphone T–55 and crystal pick-up			x	1st.

*First and second echelon maintenance is performed by organizational personnel.

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

66. MAINTENANCE PARTS FOR PUBLIC ADDRESS SETS PA–5 AND PA–5–A (Added). The following information was compiled on 14 March 1945. The appropriate sections of the ASF Signal Catalog for Public Address Sets PA–5 and PA–5–A are:

Organizational Spare Parts:

SIG 7, PA–5

Higher Echelon Spare Parts:

SIG 8, PA–5

For the index of available catalog sections, see the latest section of ASF Signal Supply Catalog SIG 2.

Paragraphs 42 to 45, inclusive are renumbered 67 to 70, inclusive.

[AG 300.7 (20 May 45)]

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G. C. MARSHALL
Chief of Staff

OFFICIAL:
J. A. ULIO
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The Adjutant General

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Refer to FM 21–6 for explanation of distribution formula.

U. S. GOVERNMENT PRINTING OFFICE: 1945

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LIST OF ILLUSTRATIONS

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, hand-axes, pick-axes, hammers, crowbars, heavy tools, etc.

2. Cut — Use axes, hand-axes, machete, etc.

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

4. Explosives — Use firearms, grenades, TNT, etc.

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

6. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT — 1. Smash — Amplifier and record player, turntable, crystal pickup, all tubes, chassis, control knobs, panels and mountings, rectifier tubes, ammeter and chassis, switch panel, microphone, loudspeakers, driver units, transformers, batteries, spare parts, chests, stands, legs, etc.

2. Cut — All cords, wires, etc.

3. Bend and/or Break — Microphone bracket, loudspeaker brackets.

4. Burn — Pile up and burn all chests, stands, legs, smashed batteries, amplifier and record player, rectifier, microphone, loudspeakers, all cut wires, reels, spare parts and all technical manuals, records and papers.

5. Bury or Scatter — Any or all of the above pieces after breaking.

DESTROY EVERYTHING

WARNING

This equipment uses high voltage. If you touch a high voltage circuit you can get a bad shock which can burn or KILL you.

Section I

Description

---

1. GENERAL.

a. Public Address Sets PA-5 and PA-5-A are portable public address systems designed for fixed or mobile operations, and are used for reproducing audible sound either through the use of microphone or record reproduction.

NOTE: Hereafter these sets or their component parts will be designated in this Technical Manual as PA-5-(*), LS-12-(*) etc. except where specific differences occur.

b. Power sources. Public Address Set PA-5-(*) may be used from either a 110–117-volt a-c, 60 cycle, input source or a 6-volt storage battery.

c. Power output. When used with a power supply of 110–117 volts alternating current the power output of the Public Address Set PA-5-(*) at 5 per cent distortion is 20 watts and when the input voltage source is a 6-volt storage battery the power output is 16 watts at 5 per cent distortion.

d. Power input. The power input required for the amplifier only, when used on 110–117 volts, 60 cycles, alternating current is 85 watts. The power input required for the phonograph motor and amplifier is 110 watts.

e. Current Requirements. The current required by the amplifier itself when used on a six-volt storage battery is 11.5 amperes. Current required by the phonograph motor and amplifier is 15.5 amperes.

2. LIST OF COMPONENTS.

PUBLIC ADDRESS SET P-A-5(*), COMPONENTS WITH WEIGHTS AND DIMENSIONS

Quantity	*Name of component*	*Dimensions (inches)*					*Unit weight in lbs.*
		Height	*Width*	*Depth*	*Length*	*Diameter*	
2	Amplifier output lead, Cord CD-1078				6 ft.		0.25
1	Battery power cord, Cord CD-1079				5 ft.		0.75
1	AC power cord, Cord CD-1080				5 ft.		0.375
1	Battery cable, Cord CD-1081				2½ ft.		0.4375
1	Switch panel assembly	2	4	9			
1	Spare parts kit	8	11.5	20			
2	Speaker mounting bolts						
2	Technical Manuals TM 11-2504	9	5.875				.25
1	Loudspeaker Chest CH-230, or	21.5	57 (inc. two 8″ handles)	25.5 (inc. two 2″ handles)			80
1	Loudspeaker Chest CH-230-A	24.5	57 (inc. two 8″ handles)	25.5 (inc. two 2″ handles)			81
2	Loudspeakers LS-12, or	19			19¼	19	45
2	Loudspeakers LS-12-A	19			21.9375	19	46
1	Spare battery Box BX-59, contains:	11	14.5	8.75			8
1	Spare battery	9.375	10.375	7.125			47

PUBLIC ADDRESS SET PA-5(*), COMPONENTS WITH WEIGHTS AND DIMENSIONS

Quantity	*Name of component*	*Dimensions (inches)*					*Unit weight in lbs.*
		Height	*Width*	*Depth*	*Length*	*Diameter*	
1	Amplifier and accessory chest, Chest CH-229	17	64 over-all (inc. two 8″ handles)	24 over-all (inc. two 2″ handles)			134
1	Amplifier and Record Player BC-1292		16.5	9.25			33.5
1	Storage battery	9.375	10.375	7.125			47
1	Microphone T-55	5.1875	2.625	1.9375			1.125
1	Microphone Bracket M-406	13	8.5	4.5		0.164	1
1	Rectifier RA-103	9.25	6.25	5.75			10.75
2	Loudspeaker Stands M-405	48	36	32			
2	Reels RL-55		10.75			7	
2	Cranks		4.4375		10.875	0.4375	
1	Hydrometer						
2	Loudspeaker extension cords, Cord CD-1074				200 ft.		5.22
1	AC extension cord, Cord CD-1075				50 ft.		4.3
1	Spare battery cord, Cord CD-1076				12 ft.		3.375
1	Microphone cable, Cord CD-1077				25 ft.		1.0

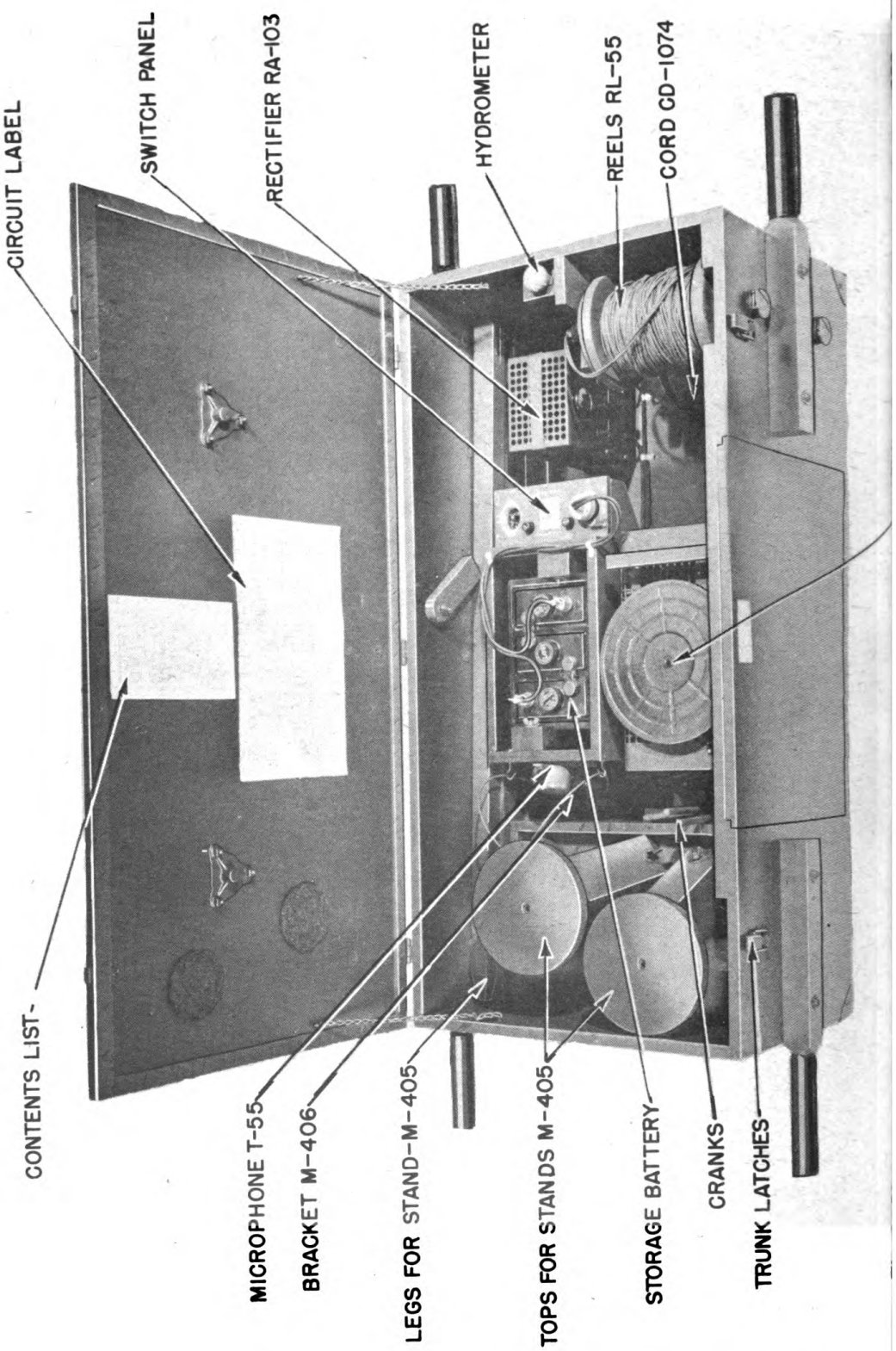

Figure 1. Amplifier and accessory chest CH-229

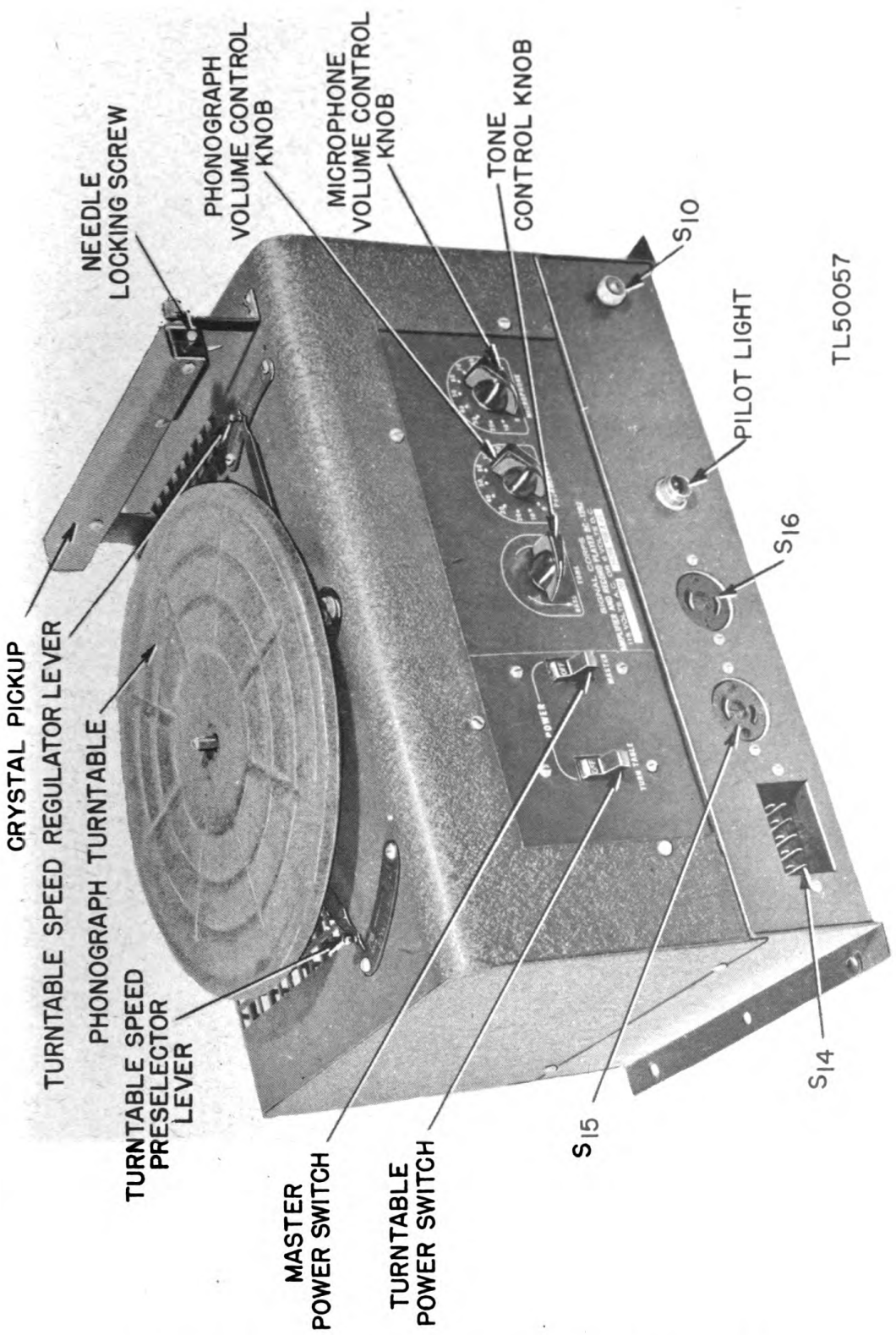

Figure 2. Amplifier and Record Player BC-1292

3. AMPLIFIER AND ACCESSORY CHEST CH-229.

Chest CH-229, (fig. 1), is constructed of five-ply plywood, painted olive drab and is equipped with a hinged lid fastened by 2 trunk type latches. A removable door in the front panel of the chest, secured by sash fasteners, provides easy access to Amplifier and Record Player BC-1292, and permits operation of the system with the chest lid closed. A neoprene weatherproof gasket is fastened to the bottom of the lid, but it will not protect the contents of the chest in case of total immersion. Two litter handles are attached to each side for carrying. Felt pads are attached on the bottom of the lid and on the left side of battery compartment to protect contents from mechanical injury. Provision is made for mounting and clamping Loudspeakers LS-12-(*) on the top of the chest. Chest CH-229 houses all components of the Public Address Sets PA-5-(*) with the exception of the loudspeakers and spare battery.

4. AMPLIFIER AND RECORD PLAYER BC-1292 (See figure 2).

The amplifier and record player is fastened by four stove bolts and tee nuts to the bottom of Chest CH-229 immediately behind the front door. This unit is a combined audio amplifier and phonograph record player. The record player is mounted on the amplifier cover. All operating control knobs, switches, and levers are mounted on the front panel of the amplifier and the amplifier cover. All power, input, and output connectors are located on the amplifier immediately below the front panel. The amplifier amplifies the sound input of the microphone and of the record player pickup.

5. SPARE BATTERY BOX, BOX BX-59 (See figure 3).

Box BX-59, housing the spare storage battery, is constructed of five-ply plywood painted olive drab and coated inside with acid resisting paint. The box is equipped with a casket-type carrying handle at each end. The box is equipped with a hinged lid which is fastened by two trunk type latches. A weatherproof rubber gasket is fastened to the bottom of the lid, but will not protect contents in case of total immersion.

6. STORAGE BATTERY (See figure 1).

This battery is located in a compartment built on the bottom of Chest CH-229 directly behind Amplifier and Record Player BC-1292. The battery is held securely in place by means of wooden blocks fastened to the inner sides of the battery compartment. The battery is a 3 cell, 6 volt, 116 ampere-hour, lead acid type.

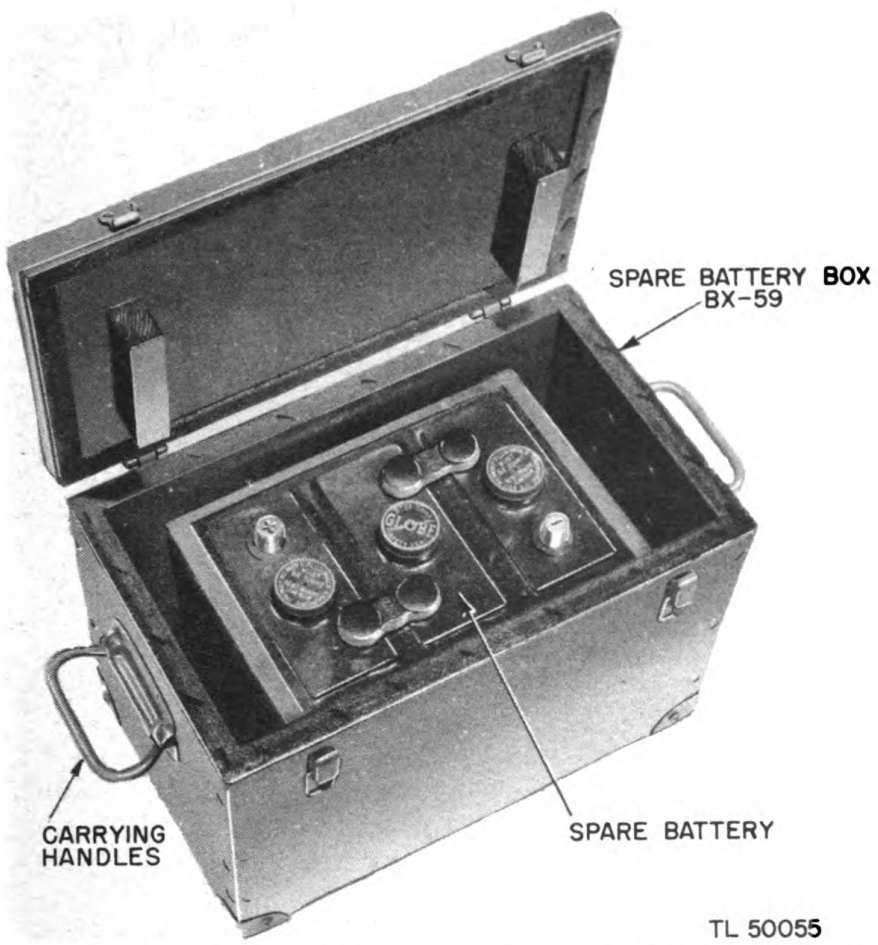

Figure 3. Spare battery and spare battery Box BX-59

7. SWITCH PANEL.

The switch panel consists of a plywood panel upon which is mounted an a-c power connector, battery power connector, a double-pole double-throw toggle switch, marked OPERATE and CHARGE, and two extractor type fuse posts and fuses (See figure 4).

8. MICROPHONE T-55 WITH BRACKET M-406 ASSEMBLED (See figure 5).

The microphone and bracket assembly is stored on the left side of the battery compartment. It is held in place by two screweyes in such a manner that the spring tension of the bracket gooseneck holds the microphone in place against a heavy felt pad. The microphone is a high-impedance dynamic type, and is equipped with a bracket that rests on the operator's shoulders. A flexible gooseneck allows adjustment of the microphone to the proper operating distance and position. If desired, the microphone may readily be unscrewed from the bracket and used by holding it in the hand. A switch located on Microphone T-55 turns it on and off.

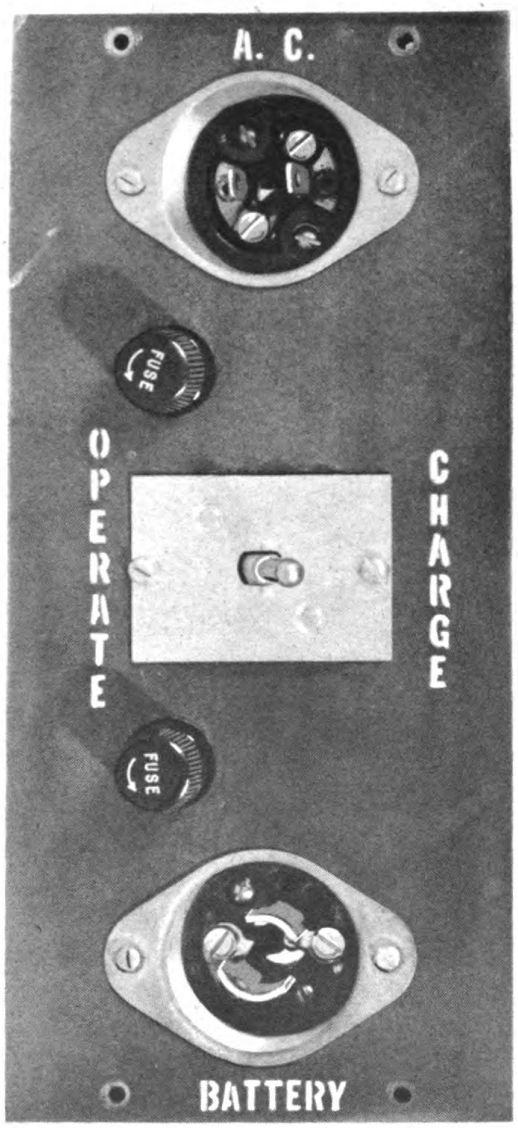

Figure 4. Switch panel

9. RECTIFIER RA-103, BATTERY CHARGER (See figure 6). Rectifier RA-103 is fastened to the bottom of the amplifier and accessory Chest CH-229 in the right rear corner by a metal strap, two tee nuts and two bolts. It is used to charge the battery in Chest CH-229 or the spare battery in Box BX-59. The charger mechanism is encased in a stamped metal housing perforated to allow proper ventilation. An ammeter mounted on the front panel of the charger indicates the rate of charge. An extractor type fuse post and fuse are mounted on the front panel of the charger for protection against shorts and overloads.

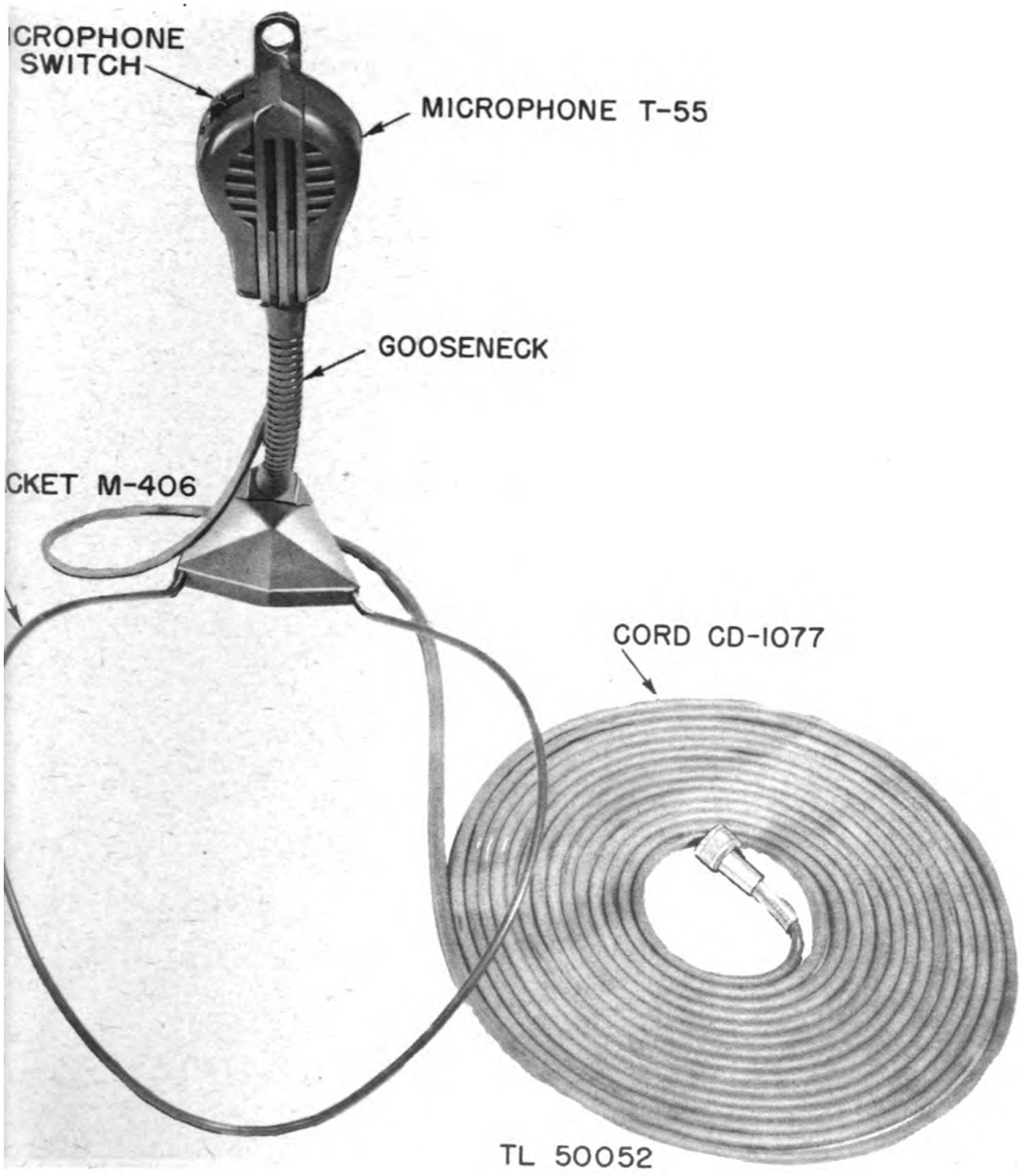

Figure 5. Microphone T-55, Cord CD-1077 and Bracket M-406

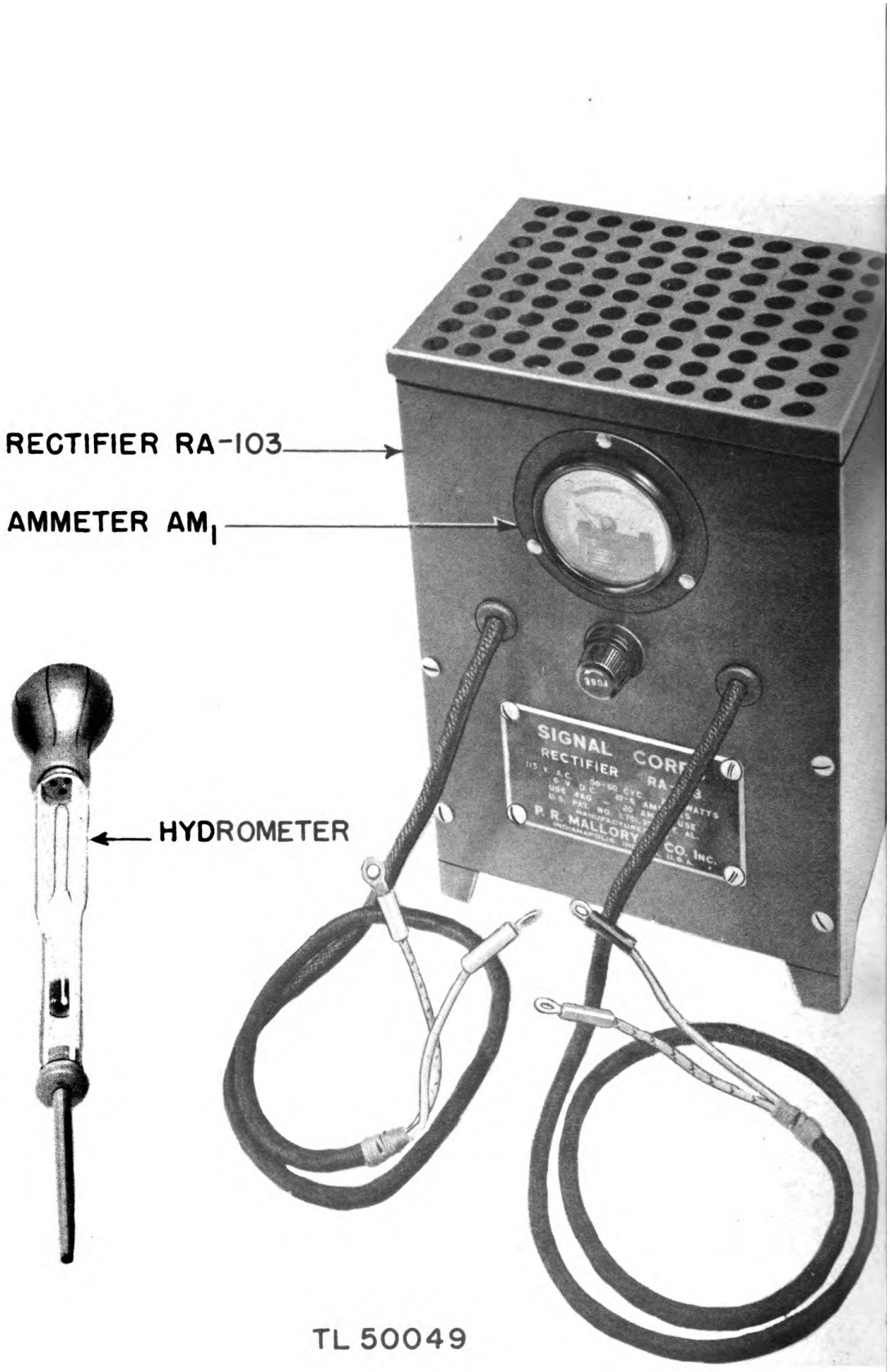

Figure 6. Rectifier RA-103

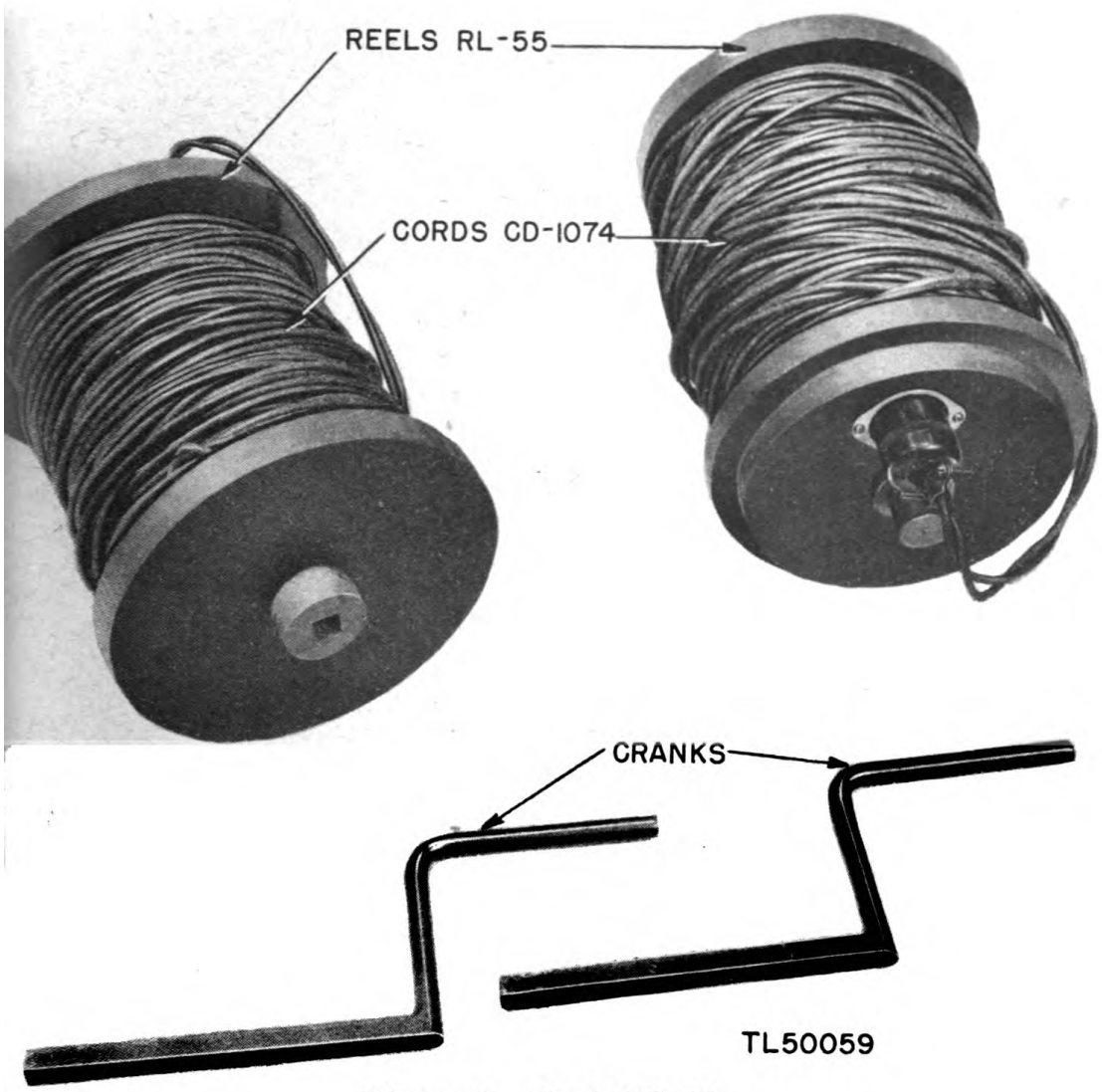

Figure 7. Reels RL-55

10. REELS RL-55 (See figure 7).

Two wooden Reels RL-55 are mounted in the front right-hand corner of Chest CH-229 and contain loudspeaker Cords CD-1074. They may be independently operated by hand cranks inserted through holes in the front of the chest. A connector mounted on each reel is permanently connected to loudspeaker extension Cords CD-1074.

11. STAND M-405, LOUDSPEAKER STANDS (See figure 16).

The six legs of the two stands are stored immediately behind the battery compartment in Chest CH-229. The tops of the stands are stored on top of the removable tray located on the left side in Chest CH-229. When assembled, the stands are 4 feet high. The legs are adjustable and may be raised or lowered to accommodate any unevenness of the mounting surface. Each leg is held in place in the stand

tops by means of a bolt and wing nut. A tapped hole in the stand tops provides a mounting for the speakers.

12. HYDROMETER (See figure 6).

The hydrometer is mounted on the inside of the right end panel of Chest CH-229. It is of standard bulb and float type commonly used for testing the specific gravity of storage batteries.

13. CORDS CD-1074, LOUDSPEAKER EXTENSIONS (See figure 7).

Cords CD-1074, when not in use, are wound on Reels RL-55. These cords consist of 200 feet of Wire W-110-B terminated at one end by plugs which may be inserted in connectors on the loudspeaker assemblies. The other ends are permanently attached to connectors in Reels RL-55.

Figure 8. Cords CD-1075, CD-1078, and CD-1076

14. CORD CD-1075, A-C EXTENSION (See figure 8).

Cord CD-1075 is stored in the removable tray under the tops of Stands M-405, on the left side of Chest CH-229. This cord consists of

50 feet of No. 18 AWG cord terminated at one end by a plug to be connected to an external source of 110-117 volt, 60 cycle, alternating current. The other end is terminated by a plug to be inserted in the connector marked A. C. located at the rear of the switch panel in Chest CH-229.

15. CORD CD-1076, SPARE BATTERY EXTENSION (See figure 8).

Cord CD-1076 is stored in the removable tray under tops of Stands M-405 on the left side of Chest CH-229. This cord consists of 12 feet of two-conductor No. 10 AWG cable, and is terminated at one end by two battery clips, one of which is marked with positive (+) polarity and the other clip is unmarked. The other end of the cord is terminated by a plug which may be inserted in the connector marked BATTERY located at the front end of the switch panel in Chest CH-229.

16. CORD CD-1077, MICROPHONE CABLE (See figure 5).

Cord CD-1077 is stored in the removable tray underneath Stands M-405 on the left side of Chest CH-229. This is a 25 foot rubber-covered shielded cord terminated at one end by a connector which screws onto a connector on Microphone T-55. The other end is terminated by a connector which screws onto a connector on Amplifier and Record Player BC-1292.

17. CORD CD-1078, AMPLIFIER OUTPUT LEADS (See figure 8).

Cords CD-1078 are stored in the removable tray underneath the speaker stand tops in the left side of Chest CH-229. These cords consist of 6 feet of wire W-110-B terminated at one end by plugs which fit into the connectors flush-mounted in Reels RL-55. These cords may also be directly connected to the connectors in Loudspeakers LS-12-(*) when the speakers are used on top of Chest CH-229. The other end of these cords terminate in plugs which are inserted in the connectors on the amplifier and record player.

18. CORD CD-1079, BATTERY POWER CABLE.

Cord CD-1079 is a five-foot cord which consists of two No. 10-AWG, stranded, rubber-covered, parallel conductors permanently attached at one end to the switch panel in the Chest CH-229 and terminated on the other end by a plug which may be inserted in a connector on the amplifier and record player.

19. CORD CD-1080, A-C POWER.

Cord CD-1080 consists of 5 feet of No. 18-AWG rubber-covered wire permanently connected at one end to the switch panel in Chest

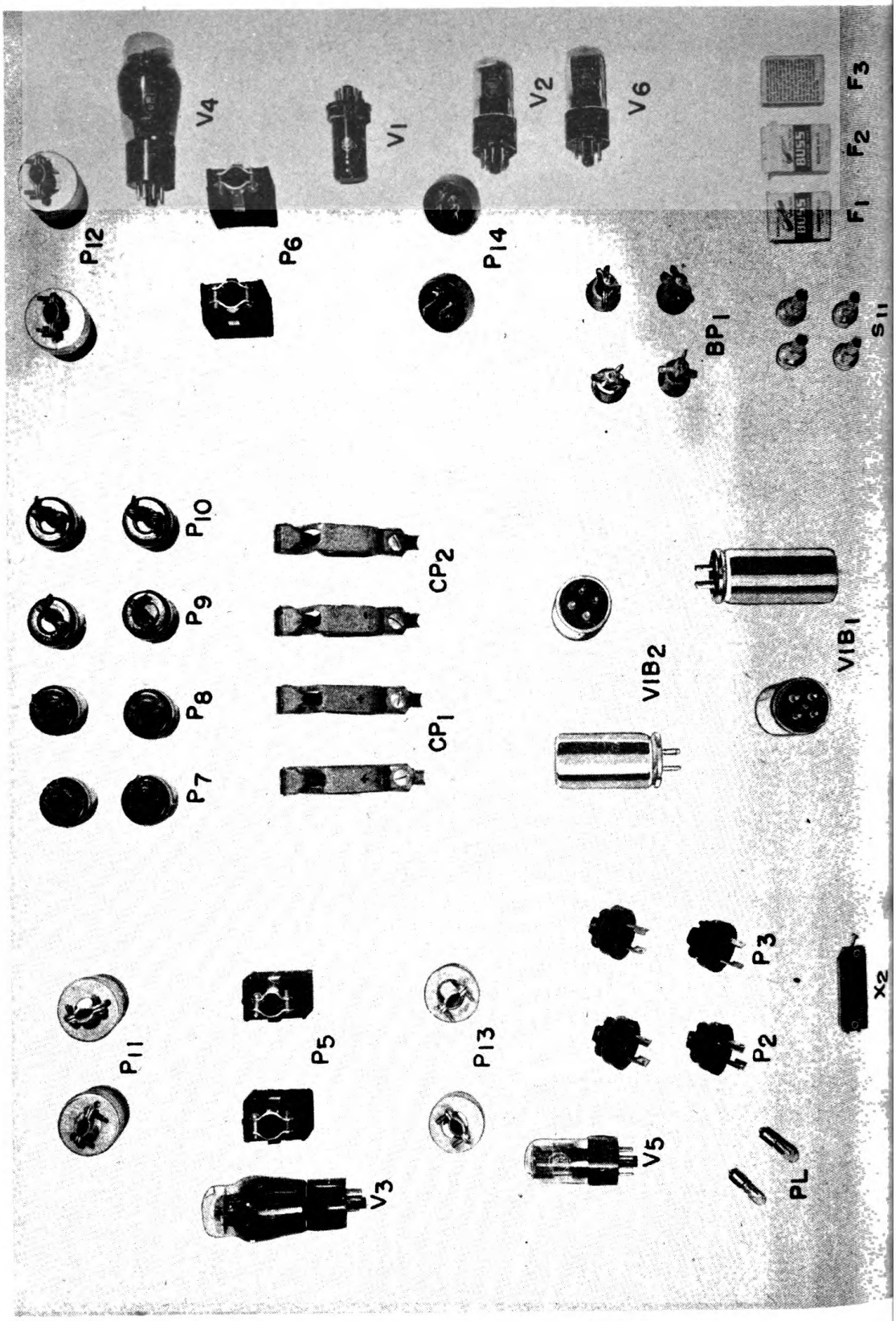

Figure 9. Spare parts kit

CH-229, and terminated at the other end by a plug which may be inserted in a connector on the amplifier and record player.

20. CORD CD-1081, BATTERY CORD.

Cord CD-1081 consists of two No. 10-AWG, stranded, rubber-covered, conductors terminated at one end by a plug which may be inserted in a connector marked BATTERY located at the front of the switch panel in Chest CH-229. The other ends may be fastened to the spare storage battery binding posts by means of battery connectors.

21. SPARE PARTS KIT.

The spare parts kit is stored in a compartment at the bottom of the left side of Chest CH-229 and consists of 24 containers of spare parts (See figure 9).

22. TECHNICAL MANUALS TM 11-2504.

These manuals are located in the spare parts compartment in the bottom of the left side of Chest CH-229.

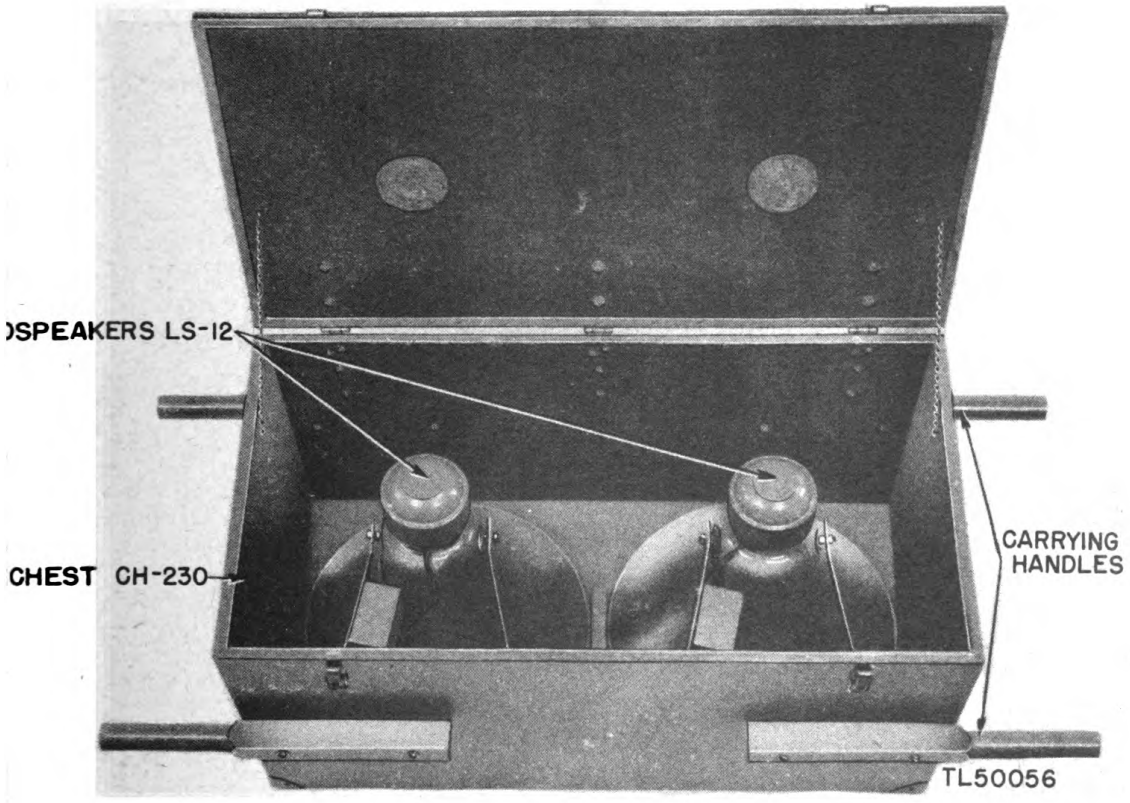

Figure 10. Loudspeakers LS-12 stored in Chest CH-230

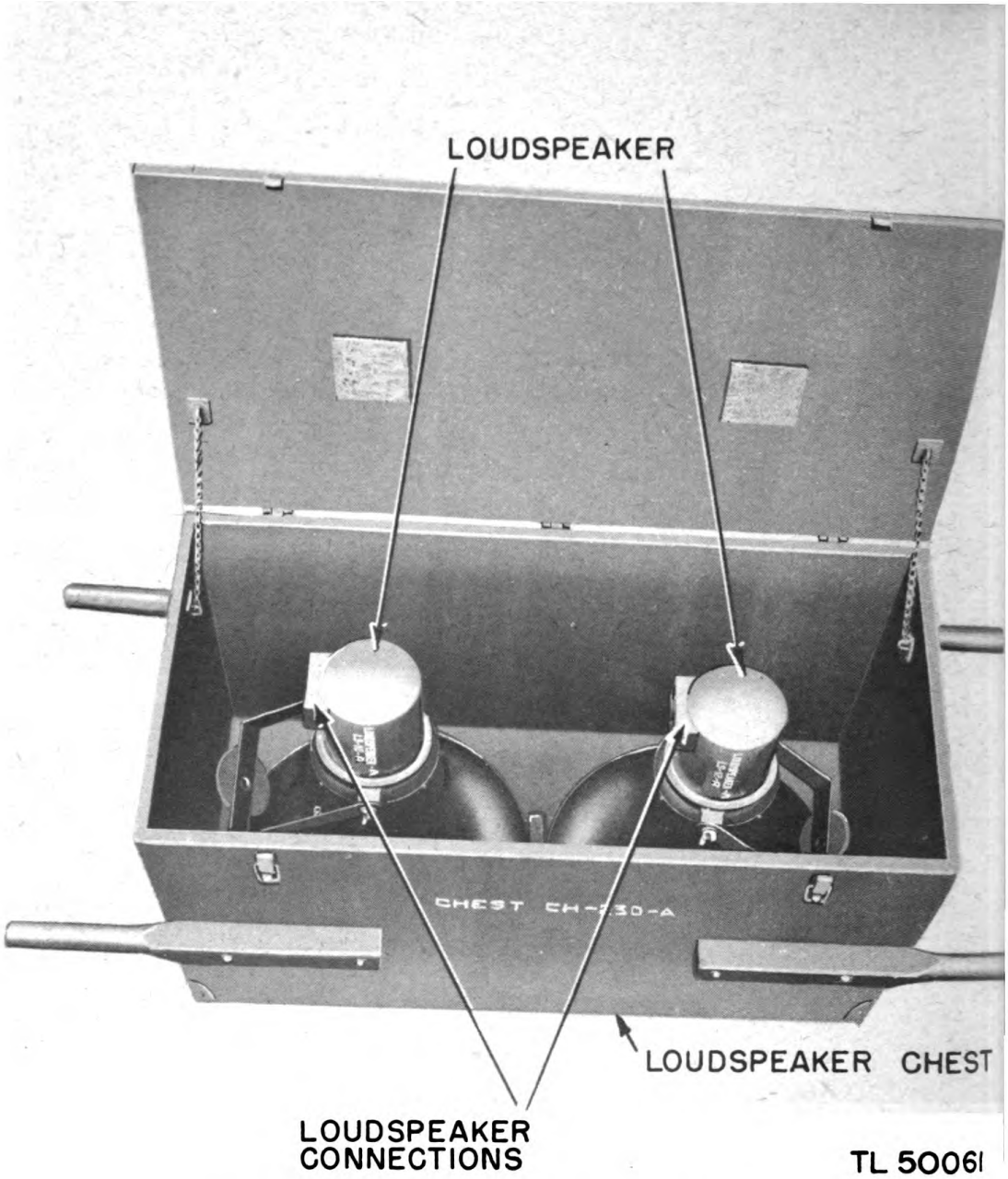

Figure 11. Loudspeakers LS-12-A stored in Chest CH-230-A

23. LOUDSPEAKER CHEST, CHESTS CH-230-(*)

Chest CH-230-(*) is constructed of five-ply plywood, painted olive drab. It is equipped with a hinged lid and secured by 2 trunk type latches. A rubber gasket fastened to the bottom of the lid provides weather proofing, but will not protect contents in case of total immersion. Two litter handles are attached to each side to permit carrying. Felt pads are attached to bottom of lid to protect contents. Chest CH-230 (figure 10) houses two Loudspeakers LS-12 and Chest CH-230-A (figure 11) will be issued when Loudspeakers LS-12-A are furnished.

24. LOUDSPEAKERS LS-12-(*) (See figure 16).

a. Speaker Horn. The speaker horn is of the reflex type. In this type of horn the sound travels back and forth three times before leaving the horn thereby providing the same efficiency as a non-reflex type of horn several times its length.

b. Speaker Driver Unit. The driver unit is the motive power of the loudspeaker. It converts the electrical energy received from Amplifier and Record Player BC-1292 into audible sound. The driver unit is attached to the small end of the speaker horn.

c. Transformer. Transformer T_4 or T_5 transforms the electrical energy received from the amplifier and record player to the proper value for the speaker driver unit.

d. Transformer Box. The transformer box contains transformer T_4 or T_5 (figure 19). In it are mounted connectors S_{19} or S_{20}, S_{21} or S_{22}.

e. Connectors. Connectors S_{19} or S_{20} receive plugs P_7 or P_8 on Cords CD-1074 (figure 19). Connectors S_{21} or S_{22} permit a connection to be made between the loudspeakers in the event it is desired to use only one loudspeaker extension Cord CD-1074.

f. Mounting Bracket and Plate. This is a U type bracket welded to a round steel plate. It supports the horn, driver unit, transformer box and its parts. It also provides the means for attaching the loudspeaker assembly to CHEST-CH-229 or to Stands M-405.

25. SPARE STORAGE BATTERY.

The spare battery, contained in Box BX-59, is of the same design as the battery located in the battery compartment of Chest CH-229.

Section II

Installation and Operation

26. INSTALLATION AND OPERATION ON ALTERNATING CURRENT WITH SPEAKERS MOUNTED ON CHEST CH-229.

a. Initial procedure.

(1) Open the lid and remove the front panel from Chest CH-229.

(2) Remove the tray from the left side of Chest CH-229.

(3) Remove Microphone T-55 and Bracket M-406.

(4) Remove Cords CD-1078, CD-1075 and CD-1077 from the tray and replace the tray in the chest. Close the lid.

(5) Open Chest CH-230-(*) and remove speakers.

(6) Place the loudspeakers on the lid of Chest CH-229. Line up the mounting holes in each speaker bracket with the threaded hole in the lid of the chest.

(7) Insert the mounting bolts through the holes in the speaker brackets and screw them into the threaded holes in the lid (figure 12).

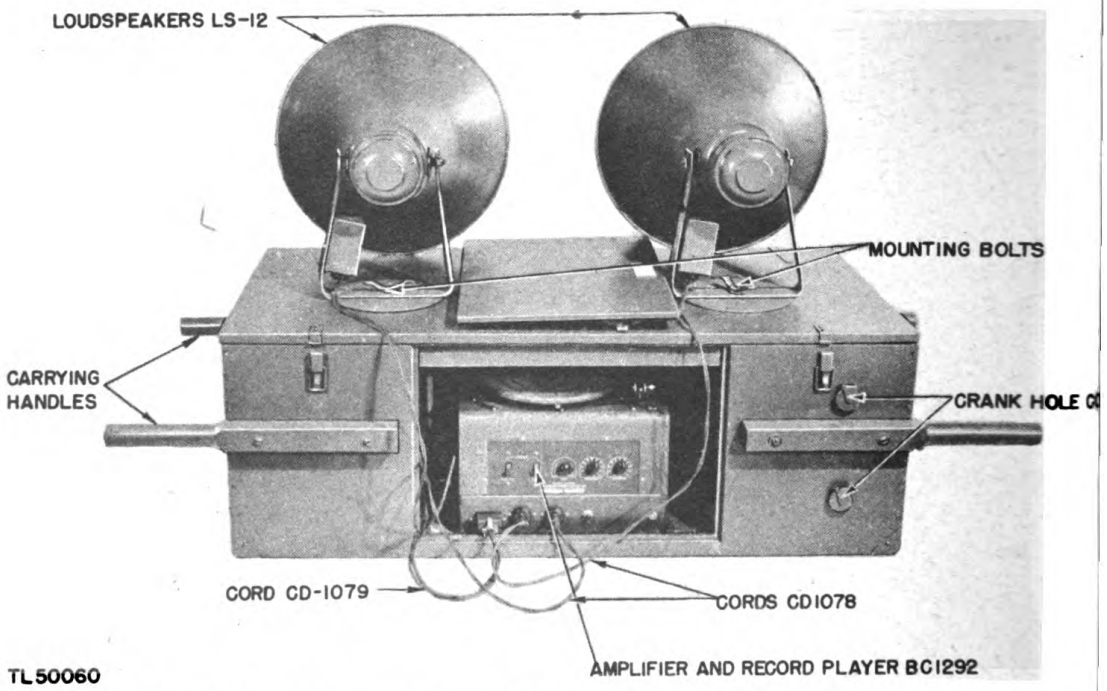

Figure 12. Loudspeakers LS-12 mounted on Chest CH-229, front view

(8) Turn the speakers so that they face the rear of the chest.

(9) If speaker LS-12 is used on Chest CH-229 of Public Address Set PA-5, fasten the front of the speaker as follows:

(a) Remove the wing bolt from the lip of the speaker horn.

(b) Slip the lip of the horn under the hinge mounted on the rear of the lid.

(c) Place the wing bolt through the slot in the hinge and into the threaded hole in the lip of the horn. Tighten the wing bolt securely (figure 13).

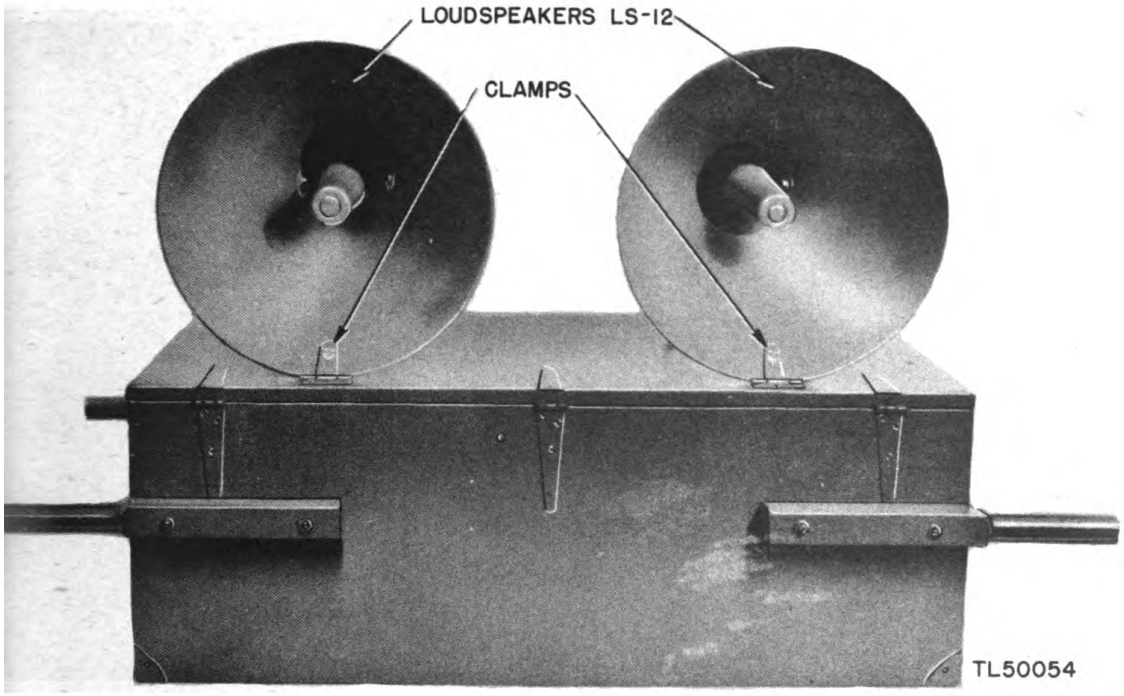

Figure 13. Loudspeakers LS-12 mounted on Chest CH-229, rear view

(10) If Speaker LS–12–A is used on Chest CH-229 of Public Address Set PA-5-A, fasten the front of the speaker as follows:

(a) Line up the hook mounted on the lip of the speaker with the trunk latch mounted on the rear of Chest CH-229-A.

(b) Place the wire loop of the trunk latch over the hook on the speaker and close the latch.

b. Connections (See figure 14).

(1) Place the plug of Cord CD-1079 (marked A-C) in the connector on the front of the amplifier and record player.

(2) Plug the two Cords CD-1078 into the front panel of the amplifier and record player.

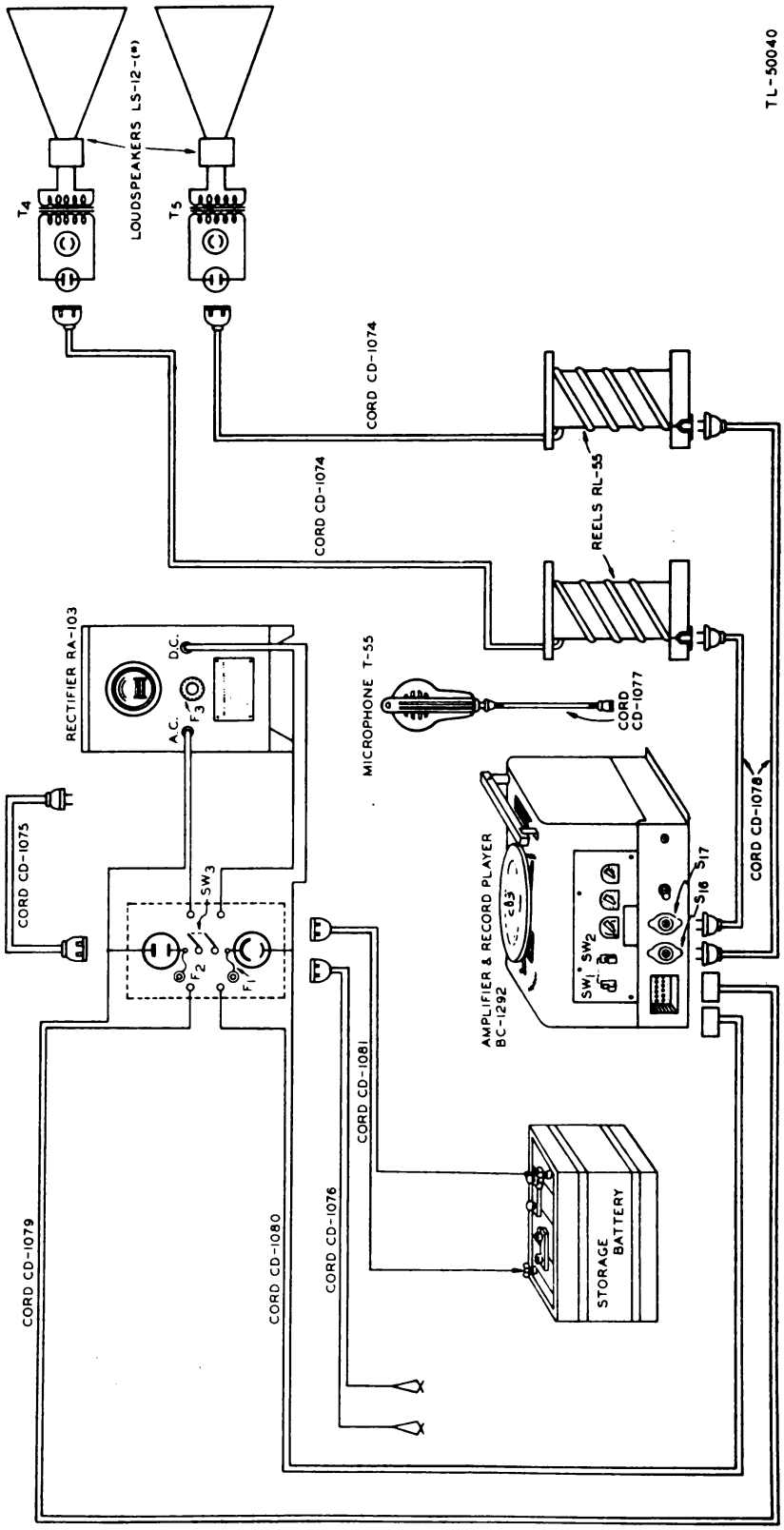

Figure 14. Public Address Set PA-5-(*), cording diagram

(3) Plug the opposite ends of Cords CD-1078 into Speakers LS-12-(*)

(4) If the microphone is to be used, screw one end of Cord CD-1077 onto the microphone plug on the right side of the front panel of the amplifier. Screw the other end of the cord into the microphone.

(5) Plug one end of Cord CD-1075 into the switch panel in Chest CH-229. Plug the other end into any available 110-volt, a-c socket.

c. Operation of PA-5-(*) with microphone (See figure 2).

(1) Place the switch on the switch panel in Chest CH-229 to the OPERATE position.

(2) Snap the switch marked TURN TABLE on the front of the amplifier to the OFF position.

(3) Set the switch marked TONE on the front of the amplifier to TREBLE position.

(4) Set the switch marked PHONOGRAPH and the switch marked MICROPHONE on the front of the amplifier to zero.

(5) Slide the switch on the microphone to the ON position. (White dot on switch showing.)

(6) Snap the switch marked MASTER on the front of the amplifier to the ON position.

(7) Turn the switch marked MICROPHONE on the front of the amplifier to the right until the desired amount of volume is obtained when speaking directly into the microphone and approximately 6 inches from it.

NOTE: If too much microphone volume is turned on, a howling, whistling sound may be encountered. This sound, known as acoustic feedback, is caused by the sound from the loudspeakers echoing from surrounding objects such as walls, trees and even the ground itself, reëntering the microphone and interferring with successful operation of the system. To reduce feedback and, in some cases, eliminate it, place the speakers in front of the microphone and facing away from it. If feedback still persists, decrease the microphone volume control slightly to a point just under where feedback occurs. Another aid is to turn the TONE control towards BASS on the dial. A still further aid in reducing feedback is to turn the microphone at right angles to the loudspeakers.

d. Operation of PA-5-(*) record player (See figure 2).

(1) Proceed as described in paragraph 26 *c* (1) through (5) inclusive.

(2) Slide the switch on the microphone to the OFF position. (White dot not showing.)

(3) Snap the MASTER switch to the ON position.

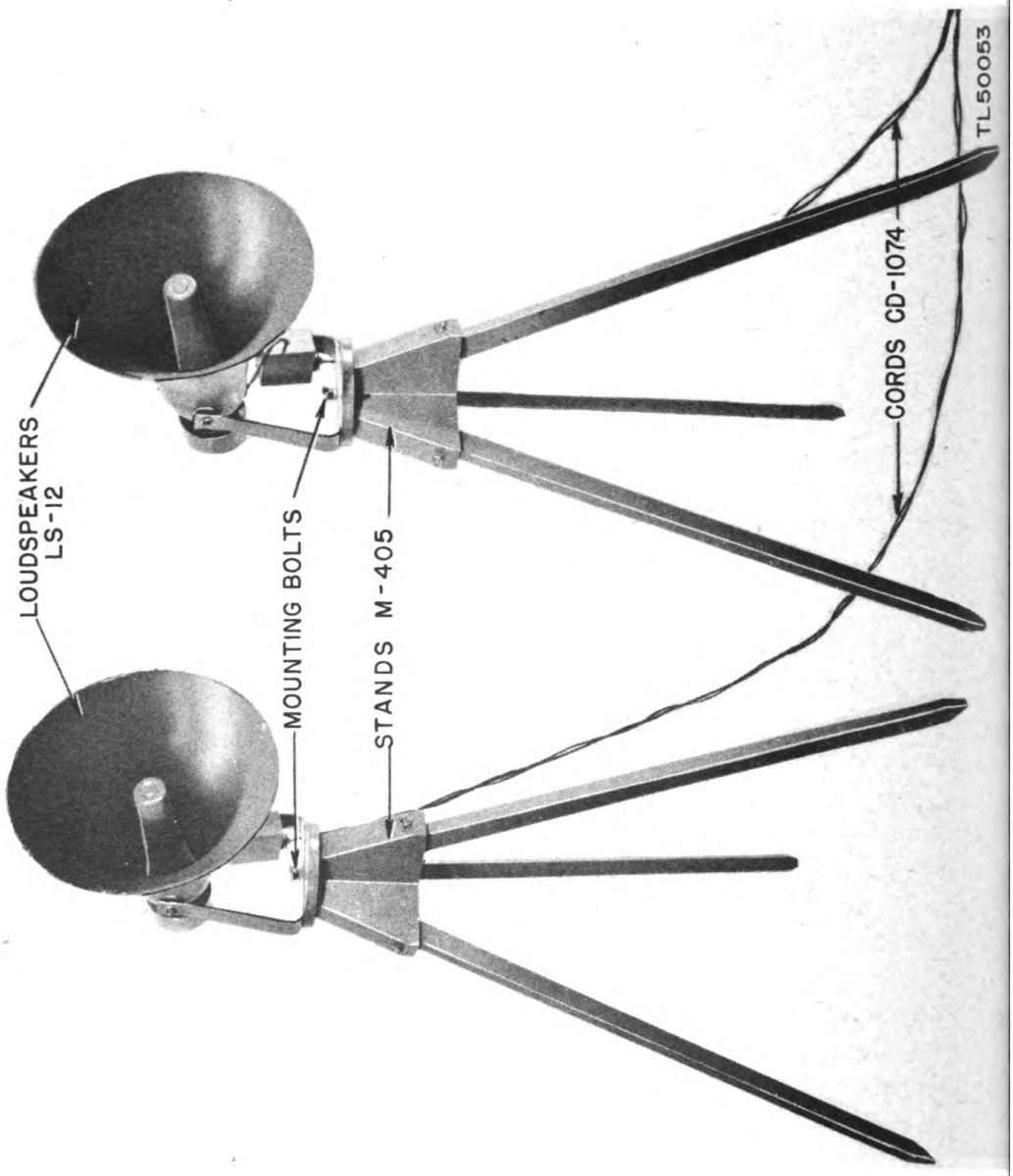

Figure 15. Loudspeakers LS-12 mounted on Stands M-405

(4) Loosen the knurled nut holding the phonograph pick-up arm to the guard bracket.

(5) Loosen the screw on the end of the pick-up arm and carefully place a needle in the needle holder on the underside of the pick-up arm. Retighten the screw securely.

(6) Place the desired record on the turn table.

(7) Set the SPEED CHANGE lever to the proper speed (78 R.P.M. or 33½ R.P.M.).

(8) Snap the TURN TABLE switch to the ON position.

(9) Place the pickup arm gently in position on the record.

(10) Turn the knob marked PHONOGRAPH to the right until the desired amount of volume is obtained.

27. INSTALLATION AND OPERATION ON ALTERNATING CURRENT WITH SPEAKERS MOUNTED ON STANDS M-405.

a. Initial procedure.

(1) Proceed as in paragraph 26 *a* (1) through (3) inclusive.

(2) Remove the two tops and six legs, for Stands M-405 (figure 1) and Cords CD-1078, CD-1075 and CD-1077 from the tray and replace the tray in Chest CH-229.

(3) Pull the ends of Cords CD-1074 through the right side of the front panel of Chest CH-229 to the desired length.

(4) Plug one end of Cords CD-1078 into the front panel of the amplifier. Plug the opposite ends of the cords into Reels RL-55.

(5) Turn the two stand tops upside down.

(6) Insert the three stand legs into the three openings provided in each stand top. Tighten the wing nuts provided. Set the stands on their legs and adjust the legs to compensate for uneven ground.

(7) Place Loudspeakers LS-12-(*) on Stands M-405. Line up the hole on the speaker stand with the hole in the base of the loudspeaker plate attached to the bracket.

(8) Insert the mounting bolts through the holes and screw on tightly.

(9) Make certain that the two nuts holding the speakers to the "U" brackets are tight after adjusting the speakers to the desired vertical position.

(10) Loosen the mounting bolts one-half turn and rotate each speaker to the desired direction. Retighten the mounting bolts.

(11) Attach each Cord CD-1074 to each Loudspeaker LS-12-(*) by inserting the plugs into the connectors. Twist to the right to lock in place. Figure 15 shows speakers mounted on Stands M-405.

(12) Proceed as in paragraph 26 *b*, *c*, and *d*, inclusive.

28. BATTERY OPERATION, SPEAKERS MOUNTED ON CHEST CH-229.

a. Initial procedure.

(1) Open the lid and remove the front panel from Chest CH-229.

(2) Remove the tray from the left side of Chest CH-229.

(3) Remove Microphone T-55 and Bracket M-406.

(4) Remove Cords CD-1078, CD1079 and CD-1081 from the tray and replace the tray. Close the lid.

(5) Proceed as described in paragraph 26 *a* (5) through (10) inclusive.

b. Connections (See figure 14).

(1) Place the plug of Cord CD-1080 (marked BATTERY) into the connector on the front panel of the amplifier and record player.

(2) Plug Cord CD-1081 into the connector marked BATTERY on the switch panel in Chest CH-229. Twist right to lock in place.

(3) Press the battery clips on the other end of Cord CD-1081 firmly over the battery terminals. Be sure to connect the black wire to the negative terminal of the battery and the white wire to the positive terminal.

(4) Proceed as in paragraph 26 *b* (1) through (4) inclusive.

c. Operation of PA-5-(*) with microphone. Proceed as described in paragraph 26 *c*.

d. Operation of PA-5-(*) record player. Proceed as described in paragraph 26 *d*.

29. INSTALLATION AND BATTERY OPERATION WITH SPEAKERS MOUNTED ON STANDS M-405.

a. Initial procedure.

(1) Open the lid and remove the front panel from Chest CH-229.

(2) Remove the tray from the left side of Chest CH-229.

(3) Remove the Microphone T-55 and Bracket M-406.

(4) Remove Cords CD-1078, CD-1079 and CD-1081 from the tray and replace the tray in the chest.

(5) Proceed as described in paragraph 27 *a* (2) through (12) inclusive.

b. Connections. Proceed as described in paragraph 28 *b* (1) through (3) inclusive.

c. Operation of PA-5-(*) with microphone. Proceed as described in paragraph 26 *c*.

d. Operation of PA-5-(*) record player. Proceed as described in paragraph 26 *d*.

30. SPARE BATTERY OR VEHICULAR BATTERY OPERATION. Procedure for spare battery and vehicular battery installation and operation is the same as that described in paragraphs 28 and 29 except that Cord CD-1076 instead of Cord CD-1081 is used in making the connection from the spare battery or vehicular battery to the switching panel in Chest CH-229.

Section III

Functioning of Parts

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31. GENERAL. Public Address Set PA-5-(*) is an audio amplification system consisting of one Microphone T-55, one Amplifier and Record Player BC-1292, two Loudspeakers LS-12-(*), one storage battery, one spare storage battery and one Rectifier RA-103 (battery charger). Power is supplied to the system by battery or by an external source of 110-117-volt, 60 cycle, alternating current.

32. MICROPHONE T-55 (See figure 5). Microphone T-55 is a high-impedance dynamic type microphone. The output level is 53 d.b. below one volt per bar. The frequency range is from 200 to 7000 cycles per second. This device converts the sound wave energy produced by the voice of the operator into electrical energy. This is accomplished by a coil moving in a magnetic field. The coil is energized by an aluminum diaphragm which derives its energy from the sound wave. The magnetic field is supplied by a permanent magnet. The voltage produced thus is of low value and, therefore, a step-up transformer is used to increase the voltage. This transformer has a primary winding (short leads) of about 50 ohms, a-c impedance at 1000 cycles per second and the secondary has an impedance of 100,000 ohms. The secondary leads are attached to the extension cord connector. From this connector the output voltage of the microphone is conducted through Cord CD-1077 to the amplifier.

33. RECORD PLAYER (See figure 2). The record player consists of a dual, variable-speed motor, a phonograph record turntable, and a crystal pickup. The motor operates at either 33⅓ or 78 rpm. The speed is adjustable above or below these speeds. The turntable mounted on the shaft of the motor supports the phonograph record. The crystal pickup changes the mechanical waves in the grooves of a phonograph record into electrical energy. This is accomplished by the transmission of the mechanical waves through a phonograph needle to a crystal in the crystal cartridge. The varying pressure exerted on the crystal produces electrical energy. This energy is conducted through a shielded lead to a plug which is inserted in a connector on the amplifier. The voltage output is 2½ volts at 1000 cycles.

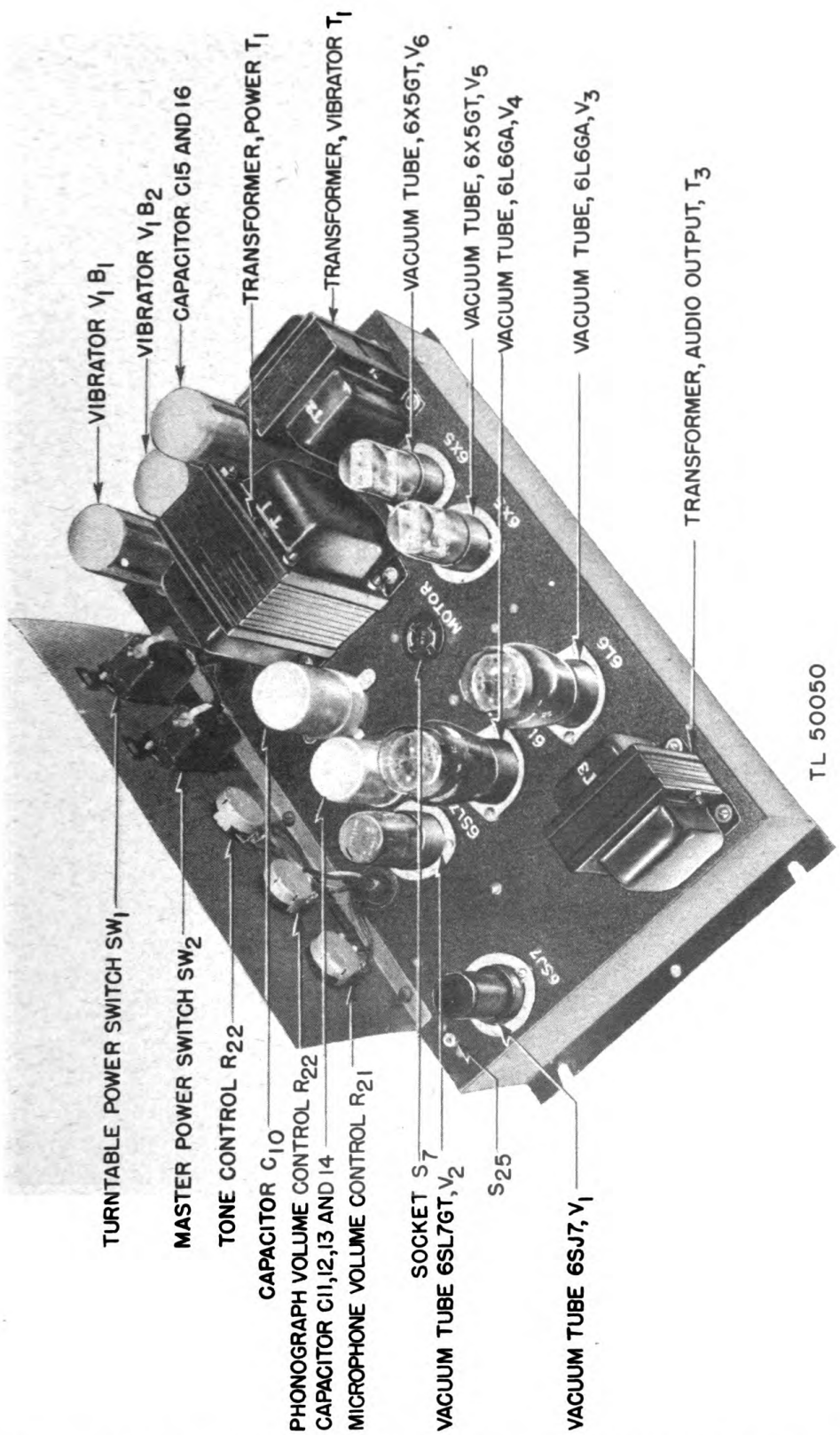

Figure 16. Amplifier and Record Player BC-1292, for PA-5-(*), top view of chassis

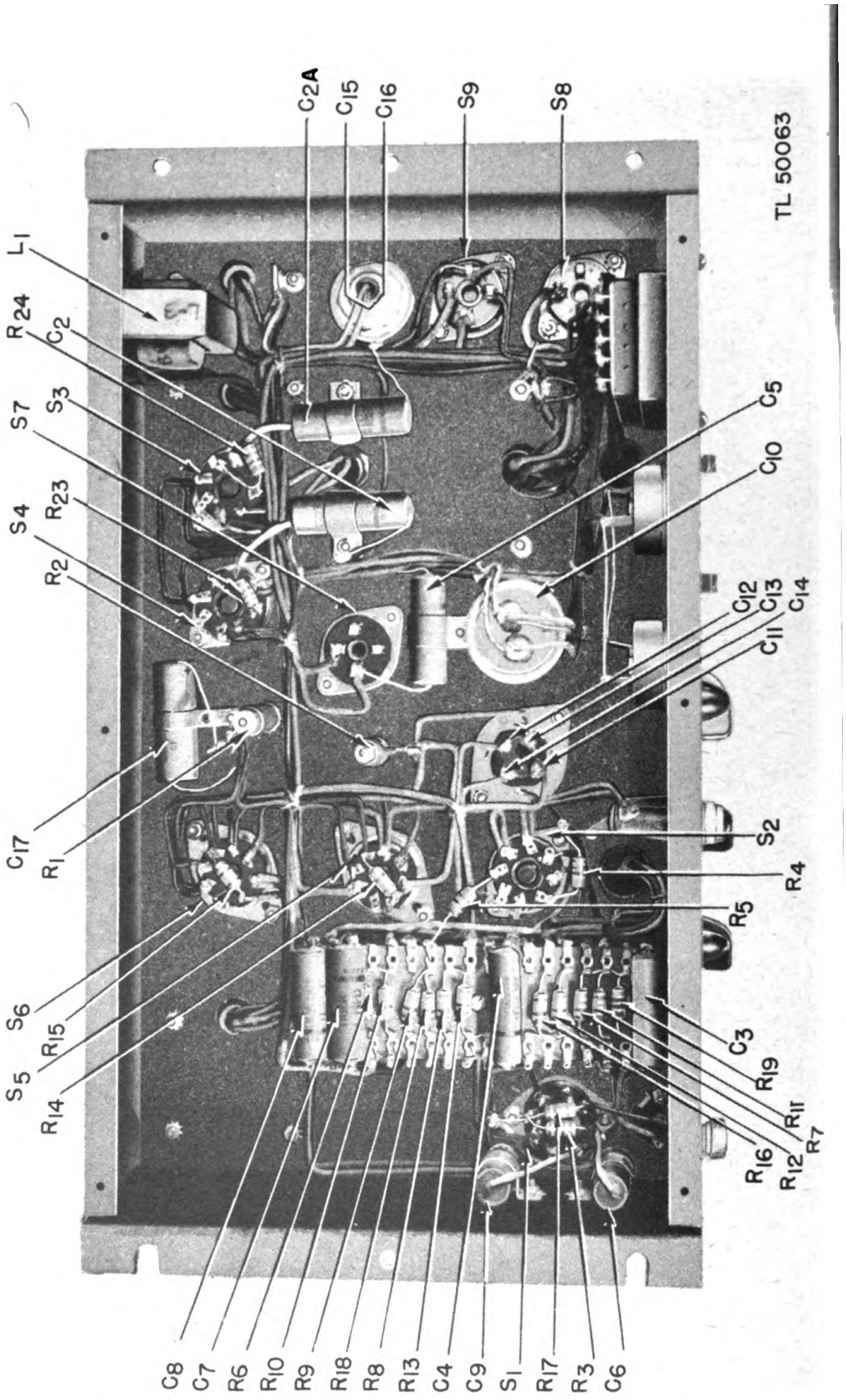

Figure 17. Amplifier and Record Player BC-1292, for PA-5, bottom view of chassis

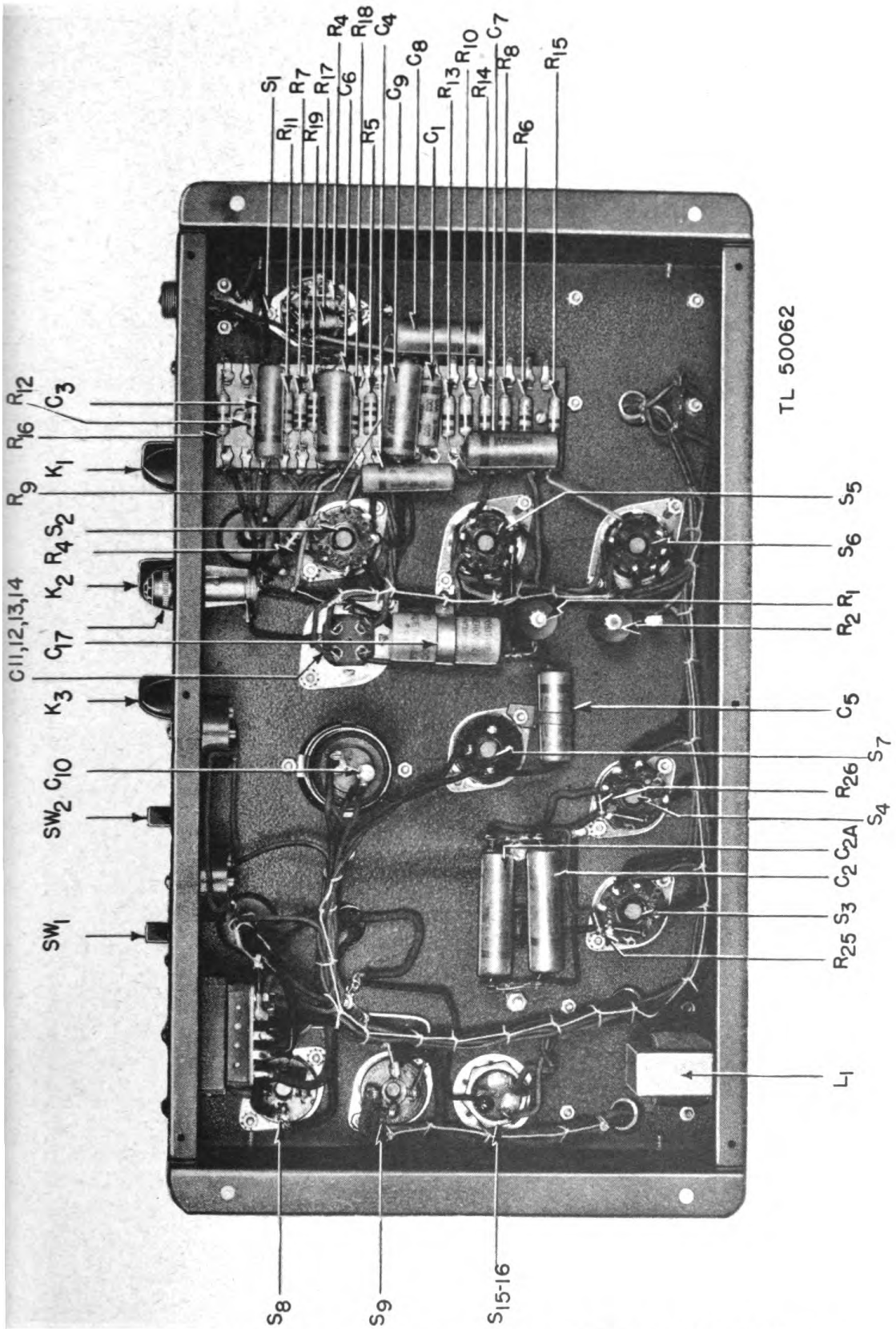

Figure 18. Amplifier and Record Player BC-1292, for PA-5-A, bottom view of chassis

34. AMPLIFIER BC-1292 (See figures 16, 17 and 18).

a. The amplifier is a six-tube, 15-to-20 watt, audio amplifier with a frequency response from 50 to 10,000 cycles. The output impedance is 250 ohms.

b. The microphone channel uses the following tubes stage by stage:
(1) Voltage amplifier stage using vacuum tube 6SJ7 (V_1).
(2) Voltage amplifier stage using first section of vacuum tube 6SL7GT (V_2).
(3) Phase inverter stage using second section of vacuum tube 6SL7GT (V_2).
(4) Push pull power amplification stage using vacuum tubes 6L6GA (V_3) and 6L6GA (V_4).

c. The record player channel uses the following tubes stage by stage:
(1) Voltage amplifier stage using first section of vacuum tube 6SL7GT (V_2).
(2) Phase inverter stage using second section of vacuum tube 6SL7GT (V_2).
(3) Push pull power amplification stage using tube 6L6GA (V_3) and tube 6L6GA (V_4).

d. Power supply of Amplifier and Record Player BC-1292:
(1) Battery (6-volt storage).
(2) 110–117 volt, 60 cycle, alternating current.

e. Voltage amplifier stage using vacuum tube V_1
(See figure 19).

The electrical energy generated by Microphone T-55 is conducted from a connector on Amplifier and Record Player BC-1292 to the control grid in V_1. Resistor R_{17} provides a return circuit for the control grid of vacuum tube V_1 to ground. The voltage drop across resistor R_3 is used for control grid bias of V_1. Capacitor C_9 affords a low impedance path to ground for the audio voltage present at the cathode of vacuum tube V_1. Resistor R_{19} reduces the d-c power supply voltage to the correct value for the screen grid of vacuum tube V_1. Capacitor C_6 affords a low impedance path to ground for the audio voltage present at screen grid of vacuum tube V_1. Resistor R_{11} reduces the d-c power supply voltage to the correct value for the plate of vacuum tube V_1. V_1 amplifies the input audio energy received from Microphone T-55. Capacitor C_{14} affords a low impedance path to ground for any audio voltage present at the junction resistors R_7 and R_{11}. This prevents audio voltages from being fed back into the power supply. Resistor R_7 filters the d-c power supply voltage fed to vacuum tube V_1. Capacitor C_3 couples the audio output voltage from the plate

of tube V_1 to microphone volume control resistor R_{21}. Resistor R_{21} provides a return circuit to ground in conjunction with resistor R_{12} for the control grid in section of vacuum tube V_2 and affords a means of varying the input signal voltage to the control grid of section 1 of vacuum tube V_2. Resistor R_{12} reduces the shunting effect of resistor R_{21} and connects resistor R_{21} to the control grid in section 1 of vacuum tube V_2.

f. Voltage amplifier stage using first section of vacuum tube V_2 (See figure 19). The voltage drop across resistor R_4 is used for control grid bias for section 1 in vacuum tube V_2. Resistor R_{13} affords a low impedance path to ground for any audio voltage present at the junction of resistors R_8 and R_{13}. Resistor R_8 filters the d-c power supply voltage fed to section 1 of vacuum tube V_2. Section 1 of vacuum tube V_2 amplifies the input audio voltages. Capacitor C_1 and resistor R_{22} (tone control) vary the amplifier frequency response by varying the impedance between the plate in section 1 in vacuum tube V_2 and ground. Capacitor C_4 couples the audio output voltage from the plate of section 1 in vacuum tube V_2 to the control grid in section 2 of vacuum tube V_2.

g. Phase inverter stage using first section of vacuum tube V_2 (See figure 19). Resistor R_{18} provides a return circuit from the control grid of section 2 in vacuum tube V_2 to the cathode of section 2 in vacuum tube V_2 through resistor R_5. The voltage drop across resistor R_5 supplies control grid bias for section 2 in vacuum tube V_2. Resistors R_9 and R_{10} reduce the d-c power supply voltage to the correct value for the plate of vacuum tube V_2. Resistor R_6 filters the d-c power supply voltage fed to the plate of section 2 in vacuum tube V_2. Capacitor C_{12} affords a low impedance path to ground for any audio voltage present as the junction of resistors R_6 and R_{10}. Capacitor C_7 couples the audio output voltage present at the plate of section 2 of vacuum tube V_2 to the control grid of vacuum tube V_3. Capacitor C_8 couples the audio output voltage present at the junction of resistors R_9 and R_5 to the control grid in vacuum tube V_4.

h. Push pull power amplification stage using vacuum tubes V_3 and V_4 (See figure 19). Resistor R_{14} provides a return circuit to ground for the control grid of vacuum tube V_3. Resistor R_{15} provides a return circuit to ground for the control grid of vacuum tube V_4. The voltage drop across resistor R_1 supplies grid bias for vacuum tubes V_3 and V_4. Capacitor C_{17} affords a low impedance path to ground for the audio voltage present at the cathodes of vacuum tubes V_3 and V_4. Resistor R_2 reduces d-c power supply voltage to the correct value for the screen grids of vacuum tubes V_3 and V_4. Capacitor C_{11} affords a low impedance path to ground for the audio signal voltage present at the screen grids of vacuum tubes V_3 and V_4. Transformer T_3 couples

the audio output voltage present at the plates of vacuum tubes V_3 and V_4 to the connectors on the front panel of Amplifier and Record Player BC-1292 and provides the correct impedance match between vacuum tubes V_3, V_4 and Loudspeakers LS-12-(*).

i. Record player channel. The electrical energy generated by the crystal pickup of the record player is conducted to resistor R_{20} (record player volume control). Resistor R_{20}, in conjunction with resistor R_{15}, affords a return circuit to ground for the control grid of section 1 in V_2 and provides a means of varying the input signal voltage to the control grid section of vacuum tube V_2. Resistor R_{16} reduces the shunting of resistor R_{20} and connects resistor R_{20} to the control grid in section 1 of vacuum tube V_2. From this point on the record player channel is identical with that of the microphone channel.

j. Power supply battery (6-volt storage battery) (See figure 19).

(1) The d-c voltage from the storage battery is conducted through Cord CD-1081 to a connector marked BATTERY on the switch panel. From this connector the d-c voltage is conducted through fuse F_2, which protects the system, to switch SW_3 on the switch panel. When switch SW_3 is in OPERATE position, Cord CD-1079 conducts d-c voltage from the switch panel to a connector on Amplifier and Record Player BC-1292.

(2) When master power switch SW_1 on Amplifier and Record Player BC-1292 is in the ON position, the amplifier wiring conducts the d-c voltage to the filaments of vacuum tubes V_1 (6SJ7), V_2 (6SL76T), V_3 (6LLGA), V_4 (6L6GA), V_5 (6X5GT), V_6 (6X5GT), pilot light PL, and power vibrator VIB_1.

(3) When Turntable switch SW_1 is in ON position d-c voltage is supplied to vibrator VIB_2. Vibrator VIB_2 converts d-c voltage to 60 cycles, a-c voltage. A-C voltage output of vibrator VIB_2 is conducted to the primary winding of transformer T_2. Transformer T_2 changes the a-c output voltage of vibrator VIB_2 to the correct value for the operation of the phonograph motor. The 110–117 volt, 60 cycles, a-c output of the secondary winding of transformer T_2 is conducted to socket S_7 on top of the chassis. Plug P_4, when inserted in socket S_7, connects a-c voltage by means of pair of wires to the phonograph motor. Capacitor C_{10} corrects the power factor of the power supply. Capacitor C_5 bypasses the output of the power supply.

(4) Vibrator VIB_1 converts d-c voltage to a-c voltage. The a-c output voltage of the vibrator is conducted to primary winding of transformer T_1. Transformer T_1 changes the a-c voltage output of the vibrator to the correct vibrator plate voltage for vacuum tubes V_5 and V_6. Capaci-

tors C_2 and C_{2A} reduce arcing of contacts in vibrator VIB_1. The high voltage a-c output of transformer T_1 is conducted to the plates of vacuum tubes V_5 and V_6. These tubes rectify the high voltage a-c output of transformer T_1 and deliver d-c voltage to the filter input capacitor C_{15}. Capacitor C_{15} acts as a reservoir to deliver current to the load during the zero current periods in the supply from vacuum tubes V_5 and V_6. Choke L_1 because of its inductance reduces pulsations in the output voltage of vacuum tubes V_5 and V_6 by opposing any sudden increase or decrease of current. Capacitor C_{16} stabilizes the output voltage of the power supply. The d-c output voltage of the power supply is carried from capacitor C_{16} to vacuum tubes V_1, V_2, V_3, and V_4.

k. Power supply, 110-117 volt, 60 cycle, alternating current.
(1) A-C voltage from an external source is conducted through Cord CD-1075 to a connector on the switch panel. From this connector the a-c voltage is conducted through fuse F_1 which protects the system, to switch SW_3 on the switch panel. When switch SW_3 is in OPERATE position, Cord CD-1080 carries the a-c voltage from the switch panel to a connector on Amplifier and Record Player BC-1292.
(2) When MASTER POWER switch SW_2 is in ON position, the amplifier wiring conducts the a-c voltage to the primary winding of transformer T_1. This transformer reduces the a-c voltage to the proper value for the filaments of vacuum tubes V_1, V_2, V_3, V_4, V_5, and V_6 and pilot light PL. When the turntable switch SW_1 is in ON position, a-c voltage is conducted to socket S_7 on top of the chassis of the amplifier. When plug P_4 is inserted in socket S_7 a-c voltage is supplied to phonograph motor. Vibrators VIB_1 and VIB_2 are not used during a-c operation and the functions of other components remain the same as for battery operation.

35. LOUDSPEAKERS LS-12-(*) (See figure 19).

This component converts the audio frequency output of Amplifier and Record Player BC-1292 into acoustical power and projects this into a specified area. Cords CD-1074 and/or CD-1078 conduct the audio output from the amplifier to connectors S_{19} and S_{20} on Loudspeakers LS-12-(*). Transformers T_4 and T_5 wired to S_{19} and S_{20} match the impedance of the 15 ohm voice coils in Loudspeakers LS-12-(*) to the 250 ohm output of the amplifier. The voice coils of Loudspeakers LS-12-(*) are immersed in a steady magnetic field produced by permanent magnets in Loudspeakers LS-12-(*). When energized, the voice coil moves in accordance with the frequency of the audio output. The voice coil is attached to a diaphragm which vibrates as the voice coil moves and thus produces acoustical power resulting in audible sound. The horn of Loudspeakers LS-12-(*) couples the diaphragm efficiently to the surrounding air.

36. RECTIFIER RA-103, BATTERY CHARGER.

Rectifier RA- 103 provides direct current to charge the storage battery. When plug P_{14} on Cord CD-1075 is connected to an external source of 117 volt, 60 cycle, a-c and plug P_{13} is inserted in connector S_{23} in the switch panel, a-c voltage is provided at switch SW_3 in the switch panel. When plug P_{11} on Cord CD-1081 is inserted into connector S_{24} on the switch panel the battery is connected to SW_3. When SW_3 is in CHARGE position a-c voltage is supplied to the primary winding of transformer T_6 in the rectifier. The secondary winding of transformer T_6 delivers a-c voltage of the correct value to the bridge type copper sulphide rectifier in Rectifier RA-103. This rectifier converts the a-c voltage supplied by T_6 to d-c voltage. The d-c voltage passes through the connector through the ammeter on the front of the rectifier which measures the rate of charge. From the ammeter d-c voltage passes through fuse F_3 which protects the system and through SW_3 on the switch panel to the battery.

Section IV

Maintenance

37. OPERATOR'S TROUBLE CHART.

When failure is encountered, check the items in the Trouble Chart before making a detailed examination. Operating personnel should attempt only such replacements and repairs as are listed in the Trouble Chart. Other and more complicated maintenance should be made only by authorized maintenance personnel.

a. No Sound Output

Probable causes	*Remedy*
(1) Power not supplied to amplifier (*a*) Battery dead or low.	Charge battery or connect spare battery or vehicular battery — See Section II — Operation.
(*b*) Loose Connection.	Check connections (fig. 19) of Cords CD-1081, CD-1079 (CD-1076 if spare battery is being used). (CD-1080 if a-c is being used.)
(*c*) Fuse (F_2) burned out (Battery operation) Fuse (F_1) burned out (A.C. operation)	Replace fuse (fig. 4). If fuse burns out again, check for short circuits.
(*d*) SW_3 on switch panel not in OPERATE position.	Put SW_3 (fig. 4) in OPERATE position.
(2) Amplifier dead (*a*) SW_2 in OFF position.	Put SW_2 (fig. 2) in ON position.
(*b*) MICROPHONE or PHONOGRAPH volume control not turned up.	Turn up controls (fig. 2).
(*c*) Defective vibrators VIB_1, VIB_2.	Replace defective vibrators (fig. 16).
(*d*) Defective tube (V_1, V_2, V_3, V_4, V_5, or V_6).	Replace defective tubes (fig. 16).
(*e*) No input to microphone channel 1. Loose connections. 2. Switch OFF. 3. Defective microphone.	Check connections of Cord CD-1077 (fig. 19). Turn on microphone switch (fig. 5). Repair or replace.

a. No Sound Output. — Continued.

Probable causes	*Remedy*
(*f*) No input to phonograph channel	
1. Loose connection.	Insert P_1 in S_{25} (fig. 19)
2. Defective crystal cartridge.	Repair or replace.
3. Failure of phonograph motor.	Repair or replace.
(3) Loudspeakers dead	
(*a*) Loose connections.	Check connections (fig. 19) of Cords CD-1074, CD-1078, and leads from transformer box to binding posts on driver units of LS-12. (Solder lugs on LS-12-A).
(*b*) Defective loudspeaker	Repair or replace.

b. Weak Sound

(1) Insufficient power supplied to amplifier	
(*a*) Low battery.	Charge battery, connect spare battery or vehicular battery.
(2). Weak amplifier	
(*a*) Microphone or phonograph. Volume controls not sufficiently turned up.	Turn up controls.
(*b*) Defective tubes.	Replace tubes (fig. 16).

c. Strong Sound with distortion

(1) Defective amplifier	
(*a*) Defective tubes.	Check and replace (fig. 16).
(*b*) Phonograph motor not rotating at proper speed.	Check setting of *control* levers (fig. 2).
(*c*) Defective crystal cartridge.	Repair or replace cartridge.
(*d*) Defective phonograph needle.	Replace needle.
(2) Defective microphone	Repair or replace microphone.

d. Strong intermittent sound

(1) Loose connections.	Check all cables and connectors (fig. 14).

e. Hum

(1) Defective amplifier.	

38. TROUBLE LOCATION AND REMEDY.

a. Battery. Before placing battery in service, read carefully the instructions attached to the battery for installation and care.

b. Testing battery electrolyte. Test the battery frequently with the hydrometer to check the specific gravity of electrolyte which indicates extent to which the battery is charged. With the cells fully charged the specific gravity will be 1.280 to 1.300. When the specific gravity is below 1.240 the battery needs charging. The level of electrolyte should never be permitted to be below the top of the plates. When it falls below this level, add water. The hydrometer is located in the rear right corner of Chest CH-229. To test battery insert tip of the hydrometer in each battery cell after removing cap. Squeeze bulb and withdraw enough electrolyte to permit float to rise from bottom of hydrometer. When float rises, read scale of float at the water line. Return electrolyte to cell from which it was withdrawn.

c. Charging the battery (See figure 19). For best operating results, keep the battery fully charged. The battery may be discharged to the full amount that it will give, provided that it is immediately recharged. However, overdischarging, as a constant practice, will soon result in permanent damage. Persistent overcharging also will tend to damage the battery. While charging the battery, always keep the lid of Chest CH-229 open to permit ventilating of battery charger and battery and to allow the rapid dissipation of fumes. To charge battery in Chest CH-229, proceed as follows:

(1) Be sure battery binding posts are securely pressed on battery terminals.

(2) Insert plug P_{11} on battery cable Cord CD-1081 into connector S_{24} on the switch panel and twist to right to lock into place.

(3) Insert plug P_{13} on a-c extension Cord CD-1075 into connector S_{23} on the switch panel.

(4) Connect plug P_{14} on Cord CD-1075 to an external source of 110–117 volt, 60 cycle, alternating current.

(5) Put switch SW_3 on the switch panel in CHARGE position.

(6) Check ammeter on Rectifier RA-103. The needle should be in *green* (charge) segment of scale. If needle registers in *red* (danger) segment turn SW_3 to OPERATE position, as this indicates an excessive charging rate, which will damage the battery. An excessive charging rate is generally caused by a defective battery.

(7) Continue charging until hydrometer check of electrolyte shows a specific gravity of 1.280 to 1.300.

(8) When battery is fully charged, put SW_3 in OPERATE position.

d. Charging spare battery (See figure 19).

(1) Attach battery clip (marked +) on Cord CD-1076 to spare battery terminal (marked +). Attach battery clip (no marking) on Cord CD-1076 to spare battery terminal (marked −). Insert plug P_{12} on Cord CD-1076 into connector S_{24} on the switch panel and twist to lock in place. From here on proceed exactly as in charging battery in Chest CH-229.

e. Amplifier and Record Player BC-1292 (See figure 19).

(1) Checking tubes. To maintain the amplifier and record player in proper condition vacuum tubes V_1, V_2, V_3, V_4, V_5, and V_6 should be periodically tested on a standard tube tester. Replace weak or defective tubes immediately.

f. Tube or vibrator replacement. Remove the cage by removing two screws from each end. Raise the cage and remove plug P_1 from connector S_{25} and remove plug P_4 from socket S_7. Lift cage from chassis. Remove tube or vibrator by lifting straight up out of socket. Before placing new tube or vibrator in socket, compare type number stamped on tube or vibrator with type number stamped on socket and/or chassis. Replace plug P_1 and P_4 and place cage on chassis and fasten with screws at end.

g. Dial light replacement. Unscrew knurled ring of pilot assembly and remove from front of panel of the amplifier and record player. To remove dial light push bulb into socket, turn to left and lift out. Install new dial light and replace knurled ring.

h. Fuse replacement (See figure 4). To replace fuses F_1, F_2, and F_3, on the switch panel and Rectifier RA-103 unscrew red plastic cap marked FUSE, turn to left and lift out. This removes fuse from holder. Remove fuse from cap and insert new fuse. Be sure to use correct fuse. Replace cap and fuse by inserting in holder. Tighten by turning to the right.

39. SERVICE AND REPAIR AT REPAIR DEPOTS.

The foregoing paragraphs have described the necessary maintenance of Public Address Set PA-5-(*) in the field and troubles that can be easily located and remedied by relatively unskilled personnel and with the use of parts supplied in the spare parts kit. The following paragraphs describe the location of more obscure difficulties and the servicing of the equipment by trained technical personnel equipped with the proper tools and measuring instruments.

40. ISOLATION OF TROUBLE AND REMEDY OF MINOR DEFECTS.

a. In the event of failure of the system, first determine what part of the system has failed. The first step is to localize the trouble in one of the following:

(1) Source of power (battery or a-c)
(2) Loudspeakers LS-12-(*)
(3) Microphone T-55 or record player input.
(4) Amplifier and Record Player BC-1292.

b. Source of power — Battery. If, when the system is set up to operate on battery, no sound is produced, first determine by the following steps if power is being supplied:
(1) Connect system to alternating current. If it functions properly, the trouble is in the battery circuits.
(2) In this event, first check battery to see that it is charged sufficiently.
(3) Check Cords CD-1081, CD-1079.
(4) Check fuse F_2.
(5) Check switch SW_3 to ascertain that power is passing through it.
(6) Check vibrators as described under Section IV — Maintenance.

c. Source of power 110-117 volt, 60 cycle, alternating current. If, when the system is set up to operate on alternating current, no sound is produced, first determine if power is being supplied by making the following checks:
(1) Check source of a-c power to ascertain current is being supplied.
(2) Check Cords CD-1075 and CD-1080.
(3) Check fuse F_1.
(4) Check switch SW_3 to ascertain that power is passing through it.

d. Loudspeakers LS-12-(*) and Cords CD-1074 and CD-1078 (See figure 19). Having made sure that power is supplied to the system, next check loudspeakers. If only one speaker operates, it is obvious that the trouble exists in the cables to the other speaker or in the other loudspeaker mechanism itself. To determine whether trouble is in cable or speaker, reverse plugs P_7 and P_8 in connectors S_{19} and S_{20}. If dead speaker then functions, it is obvious that a defect exists in Cords CD-1074 or CD-1078. If, after reversal of plugs P_7 and P_8, the non-functioning speaker is still dead, then the difficulty is in the speaker itself. If trouble is in cords, check cords and connectors for continuity. If neither loudspeaker functions, and all connections are properly made and cords are intact, then you can assume the trouble exists in another part of the system.

e. Microphone T-55 and record player input. Having made sure that power is being supplied to the system and that loudspeakers and connections are in operating condition, next check microphone and record player inputs.

f. Microphone input. If no sound is produced by the system when microphone is being used, first operate the record player. If record player input is reproduced, then the trouble exists in the

microphone or microphone connections or in the first voltage amplifier stage in the amplifier. Check Cord CD-1077 and its connections. To check microphone, see Section IV — Maintenance. To check first voltage amplifier stage of the amplifier see Section IV — Maintenance.

g. Record player input (See figure 19). If no sound is produced by the system when record player is being used, first operate the microphone. If microphone input is reproduced, then the trouble exists in the record player or its connections. Check to be sure plug P_1 is properly inserted in connector S_{25}. To check record player see Section IV — Maintenance.

h. Amplifier and Record Player BC-1292.

(1) If power input, loudspeakers, and sound input have been found to be in proper condition, then the trouble in the system obviously lies in Amplifier and Record Player BC-1292. Before removing the amplifier and record player from Chest CH-229, remove cage cover from amplifier chassis. Check vacuum tubes by means of standard tube tester. Replace weak or defective tubes. The only other difficulty that can be remedied without removal of Amplifier and Record Player BC-1292 from Chest CH-229 is replacement of defective vibrators VIB_1 and/or VIB_2. To determine if VIB_1 is functioning properly, connect a d-c ammeter in series with the positive lead to the battery. This d-c ammeter should have a range of 0 to 20 amperes direct current. Be careful to observe correct polarity. Next, connect a d-c voltmeter across storage battery terminals. This d-c voltmeter should have a range of 0 to 10 volts direct current. Snap switch SW_2 on amplifier to ON position. Read input voltage and input current. Input voltage should be 6 volts. Input current should be 11.5 amperes with SW_1 in OFF position. If reading is other than 11.5 amperes, replace VIB_1. If, after replacement, reading still is not 11.5 amperes, then difficulty is not in VIB_1.

(2) To determine if VIB_2 is functioning properly, follow the identical procedure as under VIB_1 but, in addition, snap switch SW_1 on amplifier to ON position. Read input voltage and input current. Input voltage should be 6 volts. Input current should be 15.5 amperes. If reading is other than 15.5 amperes, replace VIB_2. If, after replacement, VIB_2 reading is still not 15.5 amperes, then the difficulty is not in VIB_2.

i. Remedy of major defects.

(1) Loudspeakers LS-12-(*). In general, it will be found that if trouble does develop in Loudspeakers of LS-12-(*) which is caused by the speaker itself, it will be necessary to replace the complete diaphragm head assembly.

(2) How to replace a complete driver unit assembly from Loudspeaker LS-12-A.

(*a*) Remove cover at back of Loudspeaker LS-12-A by removing the screw.

(*b*) Unsolder the two wires from the driver unit making certain to note to which solder lug each wire was connected.

(*c*) Unscrew driver unit from the horn by turning counterclockwise (to the left).

(*d*) Screw on replacement driver unit by turning clockwise (to the right).

(*e*) Solder the two wires to the solder lugs on the driver unit, making certain that the wires are placed on the same solder lugs as on the replaced driver unit. This can be observed by noting that for correct polarity in wiring one solder lug is marked #1 and the other #2.

(3) How to replace complete driver unit assembly from Loudspeaker LS-12.

(*a*) Loosen binding posts on driver unit and remove cable.

(*b*) Unscrew driver unit by turning counterclockwise (to the left).

(*c*) Screw on replacement driver unit by turning clockwise (to the right).

(*d*) Insert the two wires to the binding posts and tighten.

(*e*) Make certain that the same polarity is observed when placing the wires in the binding posts. This can be observed by noting that one post is marked − and the other +.

j. Microphone (See figure 5). A quick check with an ohmmeter will tell if the central conductor or the shielding (hooked onto the case of the connector) has been broken or shorted. The secondary of the transformer should measure about 3000 d-c ohms and primary about 20 ohms. The voice coil can be measured by disconnecting the transformer primary and checking on the terminal posts. The voice coil should measure about 40 to 50 ohms. A click should be heard in the microphone when the ohmmeter leads make contact.

k. Amplifier and Record Player BC-1292.

(1) RECORD PLAYER INPUT. To determine whether phonograph pickup is functioning properly connect a pair of earphones across the output connections of the phonograph pickup leads. While phonograph pickup needle is traveling along the grooves of a phonograph record, listen for reproduction of signal in earphones. By this means the performance of the pickup can be determined. If reproduction is not present or clear, replace crystal cartridge.

(2) PHONOGRAPH MOTOR. To determine whether phonograph motor is operating properly, place a stroboscope, if available, on record

turntable. Illuminate stroboscope. If proper pattern cannot be obtained on stroboscope by adjustment of speed lever, the motor is defective and should be replaced. It is not recommended that motor repairs be attempted in the field. Defective motors should be replaced.

(3) AMPLIFIER POWER SUPPLY. To determine if power supply is furnishing the proper voltage to the components of the amplifier, measure the d-c output voltage of the power supply with a d-c voltmeter. See voltage and resistance chart. If the proper voltage is not obtained, check for a short circuit by measuring the d-c resistance across the power supply output with an ohmmeter. Refer to resistance chart. If short circuit is indicated, check the individual components of the amplifier with an ohmmeter to locate the shorted component. If no short circuit is indicated, check the individual components for continuity with an ohmmeter.

(4) AMPLIFIER D–C VOLTAGE DISTRIBUTION. To determine whether proper d-c voltage is being delivered to vacuum tubes V_1, V_2, V_3, and V_4, measure voltage at tube socket connection with a d-c voltmeter. Refer to voltage chart. If proper voltage is not obtained, check individual components for short or open circuit with an ohmmeter.

41. VOLTAGE AND RESISTANCE CHART AMPLIFIER AND RECORD PLAYER BC-1292 OF PA-5-(*).

Measured from	*To*	*D.C. operation voltage*	*A.C. operation voltage*	*Resistance (in ohms)*
V_1 Plate Pin #8	Chassis ground	80	100	Open
V_1 Suppressor Pin #3	do	1	1.2	1000
V_1 Screen Pin #6	do	28	40	Open
V_1 Grid Pin #4	do	....	....	500,000
V_1 Cathode Pin #5	do	1	1.2	1000
V_2 Plate Pin #2	do	145	170	Open
V_2 Plate Pin #5	do	235	280	Open
V_2 Grid Pin #1	do	....	....	167,000
V_2 Grid Pin #4	do	8	25	600,000
V_2 Cathode Pin #3	do	1.7	2	3,000
V_2 Cathode Pin #6	do	50	60	100,000
V_3 Cathode Pin #3	do	300	320	Open
V_3 Screen Pin #4	do	280	300	Open
V_3 Grid Pin #5	do	....	....	250,000
V_3 Cathode Pin #8	do	22	25	250
V_4 Plate Pin #3	do	300	300	Open
V_4 Screen Pin #4	do	280	300	Open
V_4 Grid Pin #5	do	....	....	250,000
V_4 Cathode Pin #8	do	22	25	250
V_5 Cathode Pin #8	do	300	340	Open
V_5 Plate Pin #3	do	320 ac	300 ac	75
V_6 Cathode Pin #8	do	300	340	Open
V_6 Plate Pin #3	do	320 ac	300 ac	75

Section V
Supplementary Data

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5.

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
C_1	1		Capacitor, fixed, paper, tubular, 0.003 ufd. (±25%) 400 volts, high temp. wax, 3/8" dia. x 1¼" long.	Reduces high frequency response of amplifier when R_{22} is turned counterclockwise.	CD	
C_2	2		Capacitor, fixed, paper, tubular, 0.02 ufd. (±25%), 1200 volts, high temp. wax, 9/16" dia. x 1⅞" long.	By-passes secondary of T_1 and reduces arcing at contacts of V_1.	CD	MDH-12S2
C_2a			Capacitor, same as C_2	Same as C_2		
C_3	2		Capacitor, fixed, paper, tubular, 0.05 ufd. (±25%), 400 volts, high temp. wax, 1 1/2" dia. x 1⅝" long.	Couples plate of V_1 to control grid no. 1 of V_2.	CD	ZH-4024
C_4			do	Couples plate No. 1 to control grid No. 2 in V_2.	CD	ZH-4024
C_5	5		Capacitor, fixed, paper, tubular, 0.1 ufd. (±25%), 400 volts, high temp. wax, 1 1/2" dia. x 1⅝" long.	Filters M_1 power supply.	CD	2H-4027
C_6			do	By-passes screen of V_1.	CD	2H-4027
C_7			do	Couples plate No. 2 of V_2 to control grid of V_3.	CD	2H-4027
C_8			Capacitor, same as C_5.	Couples cathode No. 2 of V_2 to control grid of V_4.	CD	2H-4027
C_9			do	By-passes R_3.	CD	2H-4027

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
C_{10}	1		Capacitor, fixed, paper 3.0 ufd. (+15%−10%), 220 volts, a.c., oil filled, hermetically sealed metal can, 1½" dia. x 3⅝" long.	To correct power of M_1 power supply.	CD	VC-1753
	1		Capacitor, dry electrolytic, 4 sections of 5.0 ufd. each (+100%−0%), 450 volts, metal can, 1⅜" dia. x 2" long.		CD	UP-70-188
C_{11}			Section 1.	By-passes screens of V_3 and V_4.		
C_{12}			Section 2, same as section 1.	Decouples plate circuit of second section of V_2.		
C_{13}			Section 3, same as section 1.	Decouples plate circuit of first section of V_2.		
C_{14}			Section 4, same as section 1.	Decouples plate circuit of V_1.		
	1		Capacitor, dry electrolytic, 2 sections of 8.0 ufd. each (+75%−10%), 500 volts, metal can, 1½" dia. x 4 7/16" long.		CD	KP 10042
C_{15}			Section 1	Reduces ripple voltage in output of V_5 and V_6.		
C_{16}			Section 2, same as section 1.	Eliminates ripple voltage in output of V_5 and V_6.		
C_{17}	1		Capacitor, tubular, dry electrolytic, 50.0 ufd. (+100%−0%), 50 volts ⅝" dia. x 1 11/16" long.	By-passes R_1.	CD	BRB-505
R_1	1		Resistor, fixed, 250 ohm (±10%), 10 watt, wirewound, ⅜" dia. x 1¾" long.	Provides grid bias for V_3 and V_4.	WI	

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_2	1		Resistor, fixed, 4500 ohm (±10%), 5 watt, wire-wound, 3/8" dia. x 1¼" long.	Reduces voltage to correct value for screens of V_3 and V_4.	WI	
R_3	1		Resistor, fixed, 1000 ohm (±10%), ½ watt, insulated composition, ¼" dia. x 7/16" long.	Provides grid bias for V_1.	ER	504
R_4	1		Resistor, fixed, 3000 ohm (±10%), ½ watt, insulated composition, ¼" dia. x 7/16" long.	Provides grid bias for V_2.	ER	504
R_5	1		Resistor, fixed, 5000 ohm (±10%), ½ watt, insulated composition, ¼" dia. x 7/16" long.	Provides grid bias for second section of V_2.	ER	504
R_6	1		Resistor, fixed, 10,000 ohm (±10%), ½ watt insulated composition, ¼" dia. x 7/16" long.	Filters plate voltage of second section of V_2.	ER	504
R_7	2		Resistor, fixed, 25,000 ohm (±10%), ½ watt, insulated composition, ¼" dia. x 7/16" long.	Filters plate voltage of V_1.	ER	504
R_8			Resistor, same as R_7.	Filters plate voltage of first section of V_2.	ER	504
R_9	2		Resistor, fixed, 0.1 megohm (±10%), ½ watt, insulated composition ¼" dia. x 7/16" long.	Develops audio voltage coupled to control grid of V_4.	ER	504
R_{10}			Resistor, same as R_9.	Develops audio voltage coupled to control grid of V_3.	ER	504
R_{11}	5		Resistor, fixed 0.25 megohm (±10%), ½ watt, insulated composition ¼" dia. x 7/16" long.	Develops audio voltage coupled to grid No. 1 of V_3.	ER	504

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_{12}			Resistor, same as R_{11}.	Isolates microphone channel control.	ER	504
R_{13}			Resistor, same as R_{11}.	Develops audio voltage to grid No. 2 of V_2.	ER	504
R_{14}			Resistor, same as R_{11}.	Provides high impedance input for V_3.	ER	504
R_{15}			Resistor, same as R_{11}.	Provides high impedance input for V_4.	ER	504
R_{16}	3		Resistor, fixed, 0.5 megohm (±10%), ½ watt, insulated composition, ¼" dia. x $\frac{7}{16}$" long.	Isolates phonograph channel control.	ER	504
R_{17}			Resistor, same as R_{16}.	Provides high impedance input for V_1.	ER	504
R_{18}			Resistor, same as R_{16}.	Provides high impedance input for second section of V_2.	ER	504
R_{19}	1		Resistor, fixed, 1.0 megohm (±10%), ½ watt, insulated composition, ¼" dia. x $\frac{7}{16}$" long.	Reduces voltage to correct value for screen of V_1.	ER	504
R_{20}	3		Resistor, variable, potentiometer, (0.5 megohm) audio taper, ⅓ watt, metallized element, 1⅛" dia. x $\frac{17}{32}$" deep.	Controls volume of phonograph channel.	IRC	DS-13-133
R_{21}			Resistor, same as R_{20}.	Controls volume of microphone channel.	IRC	DS-13-133

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_{22}			Resistor, same as R_{20}.	Permits variation of high frequency response of amplifier.	IRC	DS-13-133
R_{23}	2		Resistor, fixed, 2500 ohm (±10%), ½ watt, insulated composition, ¼" dia. x $\frac{7}{16}$" long.	Reduces arcing at contacts of VIB_1.	ER	504
R_{24}			Resistor, same as R_{23}.	Same as R_{23}.		
	1		Shield, GT tube type, closed top. 1¼" dia. x 2¼" high.	Eliminates coupling between V_1 and other components of amplifier.	GO	G-1331-2
S_1	6		Socket, tube, 8 contact, octal, 1½" mtg. centers.	Receives V_1	AM	MIP-8
S_2			Socket, same as S_1.	Receives V_2.	AM	MIP-8
S_3			Socket, same as S_1.	Receives V_5.	AM	MIP-8
S_4			Socket, same as S_1.	Receives V_6.	AM	MIP-8
S_5			Socket, same as S_1.	Receives V_3.	AM	MIP-8
S_6			Socket, same as S_1.	Receives V_4.	AM	MIP-8
S_7	3		Socket, tube, 4 contact, 1½" mtg. centers.	Receives P_4 connecting AC voltage to M_1.	AM	MIP-4
S_8			Socket, same as S_1.	Receives VIB_1.	AM	MIP-4
S_9			Socket, same as S_1.	Receives VIB_2.	AM	MIP-4
* F_1	1		Fuse, 3 ampere, 250 volt, glass enclosed, ¼" dia. x 1¼" long.	Protects amplifier and rectifier against shorts and overloads.	BU	3AG-3

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* F_2	1		Fuse, 20 ampere, 25 volt, glass tube type, ¼" dia. x 1¼" long.	Same as F_1.	BU	SFE-20
	2		Fuse post, No. 1, extractor type, molded bakelite, fits ½" dia. mounting hole, in panel up to $\frac{5}{16}$" thick.	Holds F_1.	BU	HKM
			Fuse post, same as fuse post No. 1.	Holds F_2.		
* VIB_1	1		Vibrator, full wave, 8 contact, 4 prong, interruptor type, 115 cycle output, 32.5 watt capacity, 6 volt coil, 1½" dia. x 3 $\frac{3}{16}$" long.	Converts battery voltage to a.c. voltage for amplifier.	MA	634C
* VIB_2	1		Vibrator, full wave, non-synchronous 4 contact, 4 prong, 60.0 cycles output 6 volt coil, 1½" dia. x $2\frac{13}{16}$" long.	Converts battery voltage to a.c. voltage for M_1.	OA	V6370MV
	1		Pilot light assembly, with medium SFB Jewell, Type No. 20, bayonet base.	Holds pilot light.	DR	20
* PL	1		Pilot light, bayonet base, 6–8 volt, 0.15 ampere, T 3¼ bulb.	Indicates when power is supplied to amplifier.	WE	47
SW_1	2		Switch, tumbler, single pole, single throw.	Turns power to M_1 on or off.	LE	1030
SW_2			Switch, same as SW_1.	Turns power to amplifier on or off.	LE	1030
SW_3	1		Switch, toggle, double pole, double throw, 35 ampere 15 volt D.C.	Switches power from amplifier to rectifier.	CH	8710

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
T_1	1		Transformer, power, primary 117 volts a.c. 60 cycle, secondary (A) 650 v.c.t.@140 m.a., secondary (B) 6.3 volts, primary 6.1 volt battery operation.	Transforms input power voltage to correct value for operation of amplifier.	FT	11678
T_2	1		Transformer, power, primary 6 volt d.c. with full wave non-synchronous vibrator, secondary 117 volt 60 cycles.	Transforms input power voltage to correct value for operation of M_1.	GT	4D13
T_3	1		Transformer, audio output, from P.P. 6L6GA's (6600 ohms plate to plate) to 250 ohm line. 20 watt capacity.	Couples output, and matches impedance of amplifier and speakers.	GT	3C162
L_1	1		Choke, 1.3 henries @150 m.a. open frame type.	Reduces pulsations in output voltage of V_5 and V_6.	GT	6166
M_1	1		Phonograph turntable and motor, 110 v-60 cycle-78 or 33⅓ r.p.m. with 10″ turntable, speed adjustable plus or minus 10%.	Rotates turntable which holds phonograph record.	GI	D
X_1	1		Crystal pickup consisting of phonograph arm X_3 and crystal cartridge X_2.	Converts mechanical waves in phono. record into audio frequency voltage.	AS	S-8
* X_2	1		Pickup cartridge crystal 2¼″ x ⅞″ x ⅝″ mounted in bakelite case.	Same as X_1.	AS	B-1
X_3	1		Phonograph pickup arm, hollow, metal 8″ long, ⅞″ square, mounted on pivot to allow vertical or horizontal movement.	Supports phonograph cartridge X_2.	AS	

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
P_1	1		Plug, male, single conductor and shield, cable type.	Connects crystal cartridge to amplifier.	CG	M-93
P_4	1		Plug, 4 pole, 1⅞″ long, 1¼″ diam.	Connects M_1 to amplifier.	AM	PM-4
	3		Knob, bar type, 1¼″, black.	Provides means for turning tone control.	KK	292-IL
			Knob, bar type, 1¼″, black.	Provides means for turning phonograph volume control.		
			do	Provides means for turning microphone volume control.		
S_{10}	1		Receptacle, male, single contact and shield, mounting hole .375.	Receives S_{11} Cord CD-1077.	AM	PC-1-M
S_{14}	1		Receptacle, 15 poles, male, 15 amps at 125 volts, length 1⅝″, width 1⅞″, thickness 1½″.	Receives P_5 on Cord CD-1080 or P_6 on Cord CD-1079.	JO	P-315-D-B
S_{15}	2		Receptacle, 2 poles, female, 15 amps at 125 volts, polarized, twist lock, mounts in 1.4″ hole, 1.062″ deep, mounting holes 1.75″ apart.	Receives P_2 on Cord CD-1078 or P_3 on Cord CD-1078.	HH	7526
S_{16}			Same as S_{15}.			
S_{22}	1		Receptacle, 2 poles, male, 15 amps at 125 volts, parallel blades mounts in 1.65″ hole, 1.281″ deep, mounting holes 2.062″ apart.	Receives P_{13} on Cord CD-1075.	HH	4897

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
S_{24}	1		Receptacle, 2 pole, male, 20 amp. at 250 volts, twistlock mounts in 1.65″ hole, 1.281″ deep, mounting holes 2.062″ apart.	Receives P_{11} on Cord CD-1071 or P_{12} on Cord CD-1076.	HH	EC-11710
S_{25}	1		Receptacle, female, single conductor and shield, chassis type.	Receives P_1 connecting to amplifier.	GI	8134
	1		Chassis, special (not replaceable).	Mounts components to amplifier.	PM	Dwg. 226B
	1		Cage, special (not replaceable).	Covers amplifier.	PM	Dwg. 226A
	1		Panel, special (not replaceable).	Mounts SW_1, SW_2, R_{20}, R_{22} and R_{24}.	PM	Dwg. 226E
* V_1	1		Vacuum tube, type 6SJ7-GT.	Amplifies audio voltages generated by microphone.	SY	6SJ7GT
* V_2	1		Vacuum tube, type 6SL7-GT.	1st section amplifies audio voltages. 2d section acts as phase inverter.	SY	6SL7GT
* V_3	2		Vacuum tube, type 6L6-G.	Develops audio power to drive loudspeakers.	SY	6L6GA
V_4			Vacuum tube, same as V_3.	Same as V_3.		
* V_5	2		Vacuum tube, type 6X5GT.	Converts a.c. voltage to d.c. voltage.	SY	6X5GT
V_6			Vacuum tube, same as V_5.	Same as V_5.		

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Mounting lug strip, special (not replaceable).	Provides mounting for resistors.	FR	Dwg. 223
			Clamp, tube, ring type 1½" mounting centers, type.	Secures V_1 in S_1.	CM	CM 8599
			do	Secures V_2 in S_2.		
			do	Secures V_3 in S_3.		
			do	Secures V in S_4.		
	2		Clamp, tube, ring type, $1\frac{17}{32}$" mounting centers.	Secures V_3 in S_5.	CM	8527
			do	Secures V_4 in S_6.		
	2		Clamp, grounding cup type.	Secures and grounds V_1 in S_8.	CM	52035
			do	Secures and grounds V_2 in S_9.		
CD-1074	2		Cord, CD-1074 loudspeaker extension, 200 ft. of wire W-110-B with Hubbell 7506 plug attached to one end. The other end is permanently attached to a Hubbell 7524 receptacle mounted on Reed RL-55.	Connects output of amplifier from Reel RL-55 to Loudspeaker LS-12.	EA	CD-1074
* P_7	2		Plug, 2 pole, female, 15 amps at 125 volts polarized, twistlock 1⅝" long, $1\frac{5}{16}$" dia. for .562" cable max. Part of assy. CD-1074.	Connects Cord CD-1074 to S_{19} or S_{20} in either Loudspeaker LS-12.	HH	7506
P_8			do			
	1		Cable marker, part of assy. Cord CD-1074.	Identifies Cord CD-1074.		
CD-1075	1		Cord CD-1075 a.c. extension, 50 ft. of 2 conductor No. 16 stranded R.C. wire with a Hubbell 7057 male cap attached to one end and a Hubbell 7084 attached to the other end.	Connects 115 volts a.c. 60 cycles external source to S_{22} on switch panel in chest CH-229.	EA	CD-1075

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
P_{13}	1		Plug, 2 pole, female, 15 amp. at 125 volts, double T slot, 1⅜″ long, $1\frac{7}{16}$″ dia. for .562 cable max. Part of assy. Cord CD-1075.	Connects Cord CD-1075 to S_{13} on switch panel.	HH	7084
P_{14}	1		Plug, 2 pole, male, 15 amp. at 125 volts, parallel blades, 1¼″ long, 1⅝″ dia., for .562″ cable max. Part of assy. CD-1075.	Connects to external source 115 V 60 cycle a.c.	HH	7057
	1		Cable marker. Part of assy. CD-1075.	Identifies Cord CD-1075.		
CD-1076	1		Cord, CD-1076 spare battery, 12 ft. of 2 conductor no. 10 stranded R.C. wire with a Hubbell EC-11709 attached to one end and Mueller No. 21A clips, marked with polarity, attached to the other end.	Connects spare battery to S_{24} on switch panel.	EA	CD-1076
* P_{12}	1		Plug, 2 pole, female, 20 amps at 250 volts, polarized, 1¾″ long, 1⅝″ dia. for .625″ cable max. Part of assy. CD-1076.	Connects Cord CD-1076 to S_{24} on switch panel.	HH	EC-11709
*	1		Battery clip (marked +). Part of assy. Cord CD-1076.	Connects to positive part of spare battery.	MU	21A+
*	1		Battery clip (no marking). Part of assy. Cord CD-1076.	Connects to negative post of spare battery.	MU	21A
	1		Cable marker. Part of assy. Cord CD-1076.	Identifies Cord CD-1076.		
CD-1077	1		Cord, CD-1077 microphone cable consists of 25 ft. of 2 conductor shielded R.C. wire with an amphenol connector attached to each end.	Connects microphone to amplifier.	TU	CD-1077

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* S_{11}	2		Receptacle, single pole and shield length 2", dia. $\frac{11}{16}$". Part of assy. Cord CD-1077.	Connects Cord CD-1077 to S_{10} on amplifier.	AM	MC-1-F
S_{12}			Receptacle, same as S_{11}.	Connects Cord CD-1077 to S_{13} on T-55.		
	1		Cable marker. Part of assy. Cord CD-1077.	Identifies Cord CD-1077.		
CD-1078	2		Cord, CD-1078 output lead, consists of 6 ft. wire W-110-B with a Hubbell 7508 male cap attached to one end and a Hubbell 7506 female plug attached to the other end.	Connects amplifier output to Reels RL-55 or to Loudspeakers LS-12.	EA	CD-1078
* P_9	2		Plug, 2 pole, female, 15 amp. at 125 volts, polarized twistlock, $1\frac{5}{8}$" long, $1\frac{5}{16}$" dia. for .562 cable max. Part of assy. Cord CD-1078.	Connects Cord CD-1078 to S_{17} or on Reels RL-55 or to S_{19} or S_{20} on speakers.	HH	7506
P_{10}			Plug, same as P_9.	Same as P_9.		
* P_2	2		Plug, 2 pole, male, 15 amp at 125 volts, polarized, twistlock $1\frac{1}{4}$" long, $1\frac{3}{8}$" dia. for .562" cable max. Part of assy. Cord CD-1078.	Connects Cord CD-1078 to either S_{15} or S_{16} on amplifier.	HH	7508
P_3			Plug, same as P_2.	Same as P_2.		
	1		Cable marker. Part of assy. Cord CD-1078.	Identifies Cord CD-1078.		
CD-1079	1		Cord, CD-1079 amplifier battery power cable, consists of 5 ft. 2 conductor #10 R.C. stranded wire with #10 closed lugs attached to one end and a Jones S-315CCT (B) plug attached to the other end.	Connects battery power to amplifier when SW-3 is in operate position and P_8 is plugged to S_{14}.	EA	CD-1079

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* P_6	1		Plug, female, 15 contact, 15 amp. at 125 volts, length 1¾", width 1⅝" thickness. Part of Assy. Cord CD-1079.	Connects Cord CD-1079 to S_{14} on amplifier.	JO	S315CCT-B
	2		Closed lugs #10. Part of Assy. Cord CD-1079.	Connects Cord CD-1079 to switch panel.	FM	ME-168
	1		Cable marker. Part of Assy. Cord CD-1079.	Identifies Cord CD-1079.		
CD-1080	1		Cord, CD-1080 a.c. amplifier power cable, consists of 5 ft. 2 conductor #18 stranded R.C. wire with #10 closed lugs attached to one end and a Jones S-315-CCT (A) plug attached to the other end.	Connects a.c. power to amplifier when SW_3 is in operate position and P_6 is plugged into S_{14}.	EA	CD-1080
* P_5	1		Plug, 15 pole, female, 15 amps. at 125 volts, length 1¾", width 1⅝", a thickness 1". Part of Assy. Cord CD-1080.	Connects Cord CD-1080 to S_{14} on amplifier.	JO	S-315-CCTA
	2		Closed lugs #10. Part of Assy. Cord CD-1080.	Connects Cord CD-1080 to SW_3 and S_{23} on switch panel.	FM	ME-168
	1		Cable marker. Part of Assy. Cord CD-1080.	Identifies Cord CD-1080.		
CD-1081	1		Cord CD-1081 battery cable, consists of 2½ ft. of 2 conductor #10 stranded rubber covered wire, with #10 closed lugs attached to one end. The other end terminates in Hubbell #ED-11708.	Connects battery in Chest CH-229 to S_{24} on switch panel in Chest CH-229.	EA	CD-1081

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* P_{11}	1		Plug, 2 pole, female, 20 amps. at 250 volts, polarized, 1¾" long, 1⅝" dia. for .562 cable max. Part of Assy. Cord CD-1081.	Connects Cord CD-1081 to S_{24} on switch panel.	HH	EC-11708
	1		Cable marker. Part of Assy. Cord CD-1081.	Identifies Cord CD-1081.		
CH-229	1		Chest, CH-229 amplifier and accessory chest, special design, described in detail in manufacturer's drawings, and specifications. Includes the following items:	Houses all components of PA, except Loudspeakers LS-12 and spare battery.	CAEF	Dwg. TS-1
	1		Lid, special, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Covers top of Chest CH-229.	CAEF	Dwg. TS-1 Item—2
	1		Door, special, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Covers opening in front of Chest CH-229.	CAEF	Dwg TS-1 Item—3
	4		Litter handle — special, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Provide means for carrying Chest CH-229.	CAEF	Dwg. TS-1 Item—8
	2		Uniform sealing cover, metal cup with self closing cover, seals 1½" hole, in Chest CH-229 (not replaceable). Part of Chest CH-229.	Keeps dirt and water out of opening provided for cranks when not in use.	GC	TC-350
	4		Metal corner (not replaceable). Part of Chest CH-229.	Protect lower corner of Chest Chest CH-229.	SE	1180

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Name plate — $4\frac{1}{4}$ x $1\frac{3}{16}$" (not replaceable). Part of Chest CH-229.	Identifies Chest	PB	Dwg. TS-1 Item — 47
	3		Hinge-strap type, 6" long, special described in detail in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Hinges lid to Chest CH-229.	CAEF	Dwg. TS-1 Item — 14 E2220
	2		Catch — Fastener composed of two pieces, lock and top catch (not replaceable). Part of Chest CH-229.	Fastens lid to Chest CH-229.	CO	Dwg. TS-1 Item — 12 15641 — Type A
	2		Sash fastener (not replaceable). Part of Chest CH-229.	Fastens cover to Chest CH-229.	SH	Dwg. TS-1 Item 15, 40-180
	2		Chain — special stay chains made from 12" pieces of no. 40 chain (not replaceable). Part of Chest CH-229.	Limits opening of lid.	CAEF	Dwg. TS-1 Item — 16
	1		Rubber gasket, flat strip (not replaceable). Part of Chest CH-229.	Makes Chest CH-229 rain-proof.	SR	Dwg. TS-1 Item — 10
	2		Mounting for loudspeaker LS-12, casting special, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Provides firm base for Loud-speakers LS-12.	UN	LS-12 Sub-5
	2		Clamp for horn rim of LS-12, special, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Clamp horn rim of Loud-speaker LS-12 to lid of Chest CH-229.	UN	LS-12 Sub-6

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Circuit label, decalcomania 8½″ x 5½″ contains circuit diagram of PA-5 (not replaceable). Part of Chest CH-229.	Describes electrical circuit and connections of Public Address Set PA-5.	PB	
	1		List of contents, decalcomania 8½″ x 5½″ contains enumeration of components housed in CH-229 (not replaceable). Part of Chest CH-229.	Constitutes packing list for contents of Chest CH-229.	PB	
	3		Felt Pad (not replaceable). Part of Chest CH-229.	Protects speakers in Chest CH-229.	AF	TS-1 Item—9
	1		Switch panel, wood, 9″ x 4″ x ½″ special design described in detail in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Provides mounting for S_{23}, S_{24}, SW_3, and fuse posts.	CAEF	TS-1 Item—46
	1		Tray, wooden, special design described in detail in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Contains Cord CD-1075, CD-1076, CD-1077, CD-1078, and mounting bolts.	CAEF	TS-1 Item—4
	1		Tray, cover, wooden, special (not replaceable). Part of Chest CH-229.	Covers tray.	CAEF	TS-1 Item—5
	2		Block, wooden special design described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-229.	Secures storage battery in battery compartment of Chest CH-229.	CAEF	TS-1 Item—6
CH-230	1		Chest, CH-230 loudspeaker chest, special design, described in manufacturer's drawings and specifications includes the following items:	Houses both Loudspeakers LS-12.	CAEF	Dwg. TS-2

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Lid, special design, described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-230.	Covers top of Chest CH-230.	CAEF	TS-2 Item—2
	4		Litter handle, special design described in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-230.	Provides means for carrying Chest CH-230.		TS-2 Item—3
	4		Metal Corner (not replaceable). Part of Chest CH-230.	Protects lower corner of Chest CH-230.	SE	1180
	3		Hinge, strap type 6" long, special design described in detail in manufacturer's drawings and specifications (not replaceable). Part of Chest CH-230.	Hinges lid to Chest CH-230.	CAEF	Dwg.E2220 Revised
	2		Catch, fastener composed of two pieces, lock and top catch (not replaceable). Part of Chest CH-230.	Fastens lid to Chest CH-230.	CO	15641 Type A
	2		Chain, special, stay chains made from 12" pieces of no. 40 chain (not replaceable). Part of Chest CH-230.	Limits opening of lid and protects hinge.	CAEF	TS-2 Item—21
	1		Rubber gasket (not replaceable). Part of Chest CH-230.	Makes Chest CH-230 rainproof.	SR	TS-2 Item—7
	2		Felt pad (not replaceable). Part of Chest CH-230.	Protects Loudspeakers LS-12 in Chest CH-230.		TS-2 Item—8
	1		Box, special design described in manufacturer's drawings and specifications includes the following items.	Contains spare battery.	CAEF	Dwg. TS-3

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Lid, special design (not replaceable). Part of Box BX-59.	Covers top of Box BX-59.	CAEF	TS-3 Item—2
	2		Handle, metal, carrying type (not replaceable). Part of Box BX-59.	Provides means for carrying Box BX-59.	CAEF	1205-3
	2		Hinge, strap type, 3" long, special design, described in manufacturer's drawings and specifications (not replaceable). Part of Box BX-59.	Hinges lid to Box BX-59.	CAEF	E2220 Revised
	2		Catch, cabinet lock type (not replaceable). Part of Box BX-59.	Fastens lid to Box BX-59.	CO	15797-W
	4		Metal corner (not replaceable). Part of Box BX-59.	Protects lower corner of Box BX-59.	SE	1180
	1		Rubber gasket — flat strap type (not replaceable). Part of Box BX-59.	Makes Box BX-59 rainproof.	SR	TS-3 Item—7
M-405	2		Loudspeaker Stand M-405, special design, described in manufacturer's drawings and specifications includes the following items:	Supports Loudspeakers LS-12.	CAEF	Dwg. TS-4
	2		Loudspeaker stand head, special design, described in manufacturer's drawings and specifications (not replaceable). Part of Stand M-405.	Secures loudspeaker stand legs and provides mounting for Loudspeaker LS-12.	CAEF	TS-4 Item 1
	6		Loudspeaker stand leg, special design described in manufacturer's drawings and specifications (not replaceable). Part of Stand M-405.	Supports loudspeaker stand.	CAEF	TS-4 Item 2

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	2		Mounting-bolt, special design, as described in manufacturer's drawings and specifications (not replaceable). Part of Stand M-405.	Secures loudspeaker bracket on lid of Chest CH-229.	UN	LS-12 B-4
	2		Mounting, casting, special design described in manufacturer's drawings and specifications (not replaceable). Part of Stand M-405.	Supports mounting bolt and bracket of Loudspeaker LS-12.	UN	LS-12 Sub-5
	6		Bolt, washer, nut assembly, special design described in manufacturer's drawings and specifications (not replaceable).		CAEF	TS-4 Item 5
RL-55	2		Reels, RL-55, wood, special design, described in manufacturer's drawings and specifications.	Contains Cord CD-1074.	CAEF	Dwg. TS-1
S_{17}	2		Receptacle, 2 pole, male, 15 amps. at 125 volts, polarized, mounts in 1.5″ hole, 1.218″ deep, mounting holes 1.750 apart.	Receives P_9 or P_{10} on Cord CD-1078.	HH	7524
	2		Crank, metal, special wrought iron, described in manufacturer's drawings and specifications (not replaceable). Part of Reel RL-55.	Rotates Reel RL-55.	FI	TS-1 Item 11
	2		Battery, dry charged, storage 6-volt.	Supplies battery power to amplifier.		
*	2		Battery binding post non-corrosive antimonial lead, fits $\frac{11}{16}$″ terminal 1″ OD x 2″ OA. Part of battery assembly.	Provides means for connecting Cord CD-1081 to battery.	MU	103

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Hydrometer, consists of a glass barrel with a rubber bulb on the top, a rubber tube at the bottom, and calibrated float.	Tests electrolyte in storage battery.	GS	121
RA-103	1		Rectifier RA-103, Battery charger, copper sulphide, rectifier type includes the following items:	Provides d.c. voltage for charging storage batteries.	MA	107
	1		Cover and sides of Rectifier RA-103 (not replaceable). Part of assy. Rectifier RA-103.	Houses components of Rectifier RA-103.	MA	B-84501
	1		Front panel and bracket assembly of Rectifier RA-103 (not replaceable).	Mounts components of Rectifier RA-103.	MA	B-84500
AM	1		Ammeter, 15 amp. d.c. flush mounting (not replaceable). Part of Rectifier RA-103.	Indicates rate of charge of Rectifier RA-103.	MA	A-82122
F_3	1		Fuse, 20 ampere 25 volt glass tube type, $\frac{9}{32}$" dia. x 1¼" long. Part of Rectifier RA-103.	Protects Rectifier RA-103 against shorts and overloads.	BU	4AC-20
	1		Fuse post, extractor type, molded bakelite, fits ⅝" dia. mounting hole in panel up to $\frac{5}{16}$" thick. Part of RA-103.	Holds F_3.	BU	HCM
	1		Rectifier, copper sulphide, multiple disc type. Part of Rectifier RA-103.	Converts a.c. voltage to dc. voltage.	MA	IS-16B-7M
T_6	1		Transformer, open case (not replaceable). Part of Rectifier RA-103.	Reduces 115 volts 60 cycle a.c. supply voltage for rectifier.	MA	A-82127
	2		Grommets, rubber. Part of Rectifier RA-103.	Protect leads from sharp edge of front panel of rectifier.	MA	A-17837

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		Nameplate (not replaceable). Part of Rectifier RA-103.	Identifies Rectifier RA-103.	MA	
T-55	1		Microphone, high impedance, dynamic, output level — 53 db, frequency response 60 to 7000 cycles. Has slide-to-talk switch.	Converts acoustical energy into electrical energy.	TU	9-D
T_7	1		Transformer, primary 50 ohm impedance at 1000 cycles per second, secondary 100,000 ohms.	Increases voltage produced by voice coil.	TU	65T-9
* S_{17}	1		Receptacle, female, $\frac{3}{8}$" dia., mounts in .375 hole.	Connects Cord CD-1077 to microphone.	AM	PC1M
M-406	1		Microphone Bracket M-406 composed of neckwire, breastplate and flexarm includes the following items:	Supports Microphone T-55.	TU	3-H
	1		Neckwire, iron, 0.164", flexible loop, formed to fit neckline. Part of Bracket M-406.	Supports breastplate of Bracket M-406 on neck of operator.	TU	MX-100
	1		Breastplate, diecast. Part of Bracket M-406.	Receives flexarms of Bracket M-406.	TU	MX-199
	1		Flexarm, flexible goose neck.	Supports Microphone T-55.	TU	MX-125
LS-12	2		Loudspeaker LS-12 3½" re-entrant horn with 25 watt PM driver unit mounted on a U bracket with an 8" dia. plate welded to bottom of U bracket. Has 500 ohm voice coil transformer in a weatherproof metal box mounted on the U bracket with a Hubbell 7524 and a 7526 receptacle connected in parallel across 500 ohm winding of transformer.	Convert the audio frequency output of amplifier into acoustical power and project it in a specified region.	UN	PAG

*Spare parts furnished with equipment.

42. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5 — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
T_4	2		Transformer, 20 watt, matching type, 500 ohm primary to 15 ohm voice coil (not replaceable). Part of Loudspeaker LS-12.	Couples amplifier to voice.	ETC	LS-12 T-2
T_5			Same as T_4 (not replaceable). Part of Loudspeaker LS-12.			
S_{19}	2		Receptacle, 2 pole, male, 15 amps. at 125 volts, polarized. Part of Assy. Loudspeaker LS-12.	Receives P_7 or P_8 on Cords CD-1074, or P_9 or P_{10} on Cords CD-1078.	HH	7524
S_{20}			do	do		
S_{21}	2		Receptacle, female, 2 pole, 15 amps. at 125 volts, polarized, mounts in 1.4″ hole, 1.062″ deep, mounting holes 1.75″ apart. Part of Assy. Loudspeaker LS-12.	Provides for connecting.	HH	7526
S_{22}			do	do		
	2		Horn, 3½″ reflex, exponential, air column type.	Concentrates and directs sound into the desired area.	UN	Drawing LS-12, H-2, H-3, H-4 and H-5.

43. INDEX OF MANUFACTURERS FOR PUBLIC ADDRESS SET PA-5.

Abbreviation	*Name and address*
CD	Cornell Dubilier Electric Corp., 1000 Hamilton Blvd. Plainfield, N. J.
WI	Wirt Co., 5221 Greene St., Germantown, Philadelphia, Pa.
ER	Eire Resistor Corp., 644 W. 12th St., Erie, Pa.
IRC	International Resistance Co., 18 W. Chelton St., Philadelphia, Pa.
GO	Goat Metal Stampings, Inc., 314 Dean St., Brooklyn, N. Y.
AM	American Phenolic Corp., 1830 S. 54th Ave., Chicago, Ill.
BU	Bussmann Mfg. Co., University at Jefferson, St. Louis, Mo.
WE	Westinghouse Elec. & Mfg. Co., Westinghouse Lamp Div., Bloomfield, N. J.
UN	University Laboratories, 225 Varick St., New York, N. Y.
LE	Leviton Mfg. Co., 236 Greenpoint Ave., Brooklyn, N. Y.
CH	Cutler Hammer, Inc., 1401 W. St. Paul Ave., Milwaukee, Wis.
FT	Freed Transformer Co., 72 Spring St., New York, N. Y.
GT	General Transformer Corp., 1250 W. Van Buren St., Chicago. Ill.
GS	General Scientific Equip. Co., 1346 W. Somerset St., Philadelphia, Pa.
MA	P. R. Mallory Co., Inc., 3029 E. Washington St., Indianapolis, Ind.
OA	Oak Mfg. Co., 1200 N. Claybourne Ave., Chicago, Ill.
EA	The Eastern Co., 620 Memorial Drive, Cambridge, Mass.
TU	The Turner Co., 909 17th St., N. E., Cedar Rapids, Iowa
CAE	The Theodore Schwamb Co., 1167 Massachusetts Ave., Arlington, Mass.
GI	General Industries Co., Olive & Taylor Sts., Elyria, Ohio
AS	Astatic Corp., 830 Market St., Youngstown, Ohio
CI	Cinch Mfg. Co., 2335 W. Van Buren St., Chicago, Ill.
JO	Howard B. Jones Co., 2300 Wabansia Ave., Chicago, Ill.
HH	Harvey Hubbell, Inc., State St. & Bostwick Ave., Bridgeport, Conn.
MU	Mueller Electric Co., 1583 E. 31st St., Cleveland, Ohio
DR	Drake Mfg. Co., 1713 W. Hubbard St., Chicago, Ill.
KK	Kurz-Kasch Co., 1415 S. Broadway, Dayton, Ohio
PM	Par-Metal Products Corp., 32–62 49th St., Long Island City, N. Y.
SY	Sylvania Electric Products, Inc., Emporium, Pa.
FR	A. W. Franklin Mfg. Co., 175 Varick St., New York, N. Y.
WC	Whittacker Cable Co., No. Kansas City, Mo.
SR	Stockwell Rubber Co., 535 Arch St., Philadelphia, Pa.
AF	Aetna Felt Co., 204 Centre St., New York, N. Y.
PD	Phelps Dodge Copper Products Corp., 40 Wall St., New York, N. Y.
CW	Collyer Insulated Wire Co., Pawtucket, Rhode Island.
FM	Frank W. Morse Co., 301 Congress St., Boston, Mass.
GC	Gits Bros. Mfg. Co., 1846 S. Kilbourn Ave., Chicago, Ill.
PB	The Palm Bros. Decalcomania Co., 3736 Regent Ave., Cincinnati, Ohio
SE	J. H. Sessions Co., Bristol, Conn.
TS	Turner & Seymour Co., Torrington, Conn.
SH	Shelby Spring Hinge Co., Shelby, Ohio
CO	Corbin Cabinet Lock Co., New Britain, Conn.
FI	P. A. Fiebiger Co., 462 10th Ave., New York, N. Y.
DB	David Bogen Co., Inc., 663 Broadway, New York, N. Y.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A.

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
C_1	1		*Capacitor*, paper tubular, 0.003 μfd (±10%), 400 W.V., high temp. wax, 3/8" dia. x 1¼" long.	Reduces high frequency response of amplifier when R_{22} is turned counterclockwise.	AE	484
C_2	2		*Capacitor*, paper tubular, 0.02 μfd (±10%), 1200 W.V., high temp. wax, 9/16" dia. x 1⅞" long.	By-passes secondary of T_1 and reduces arcing at contacts of VIB_1.	AE	1284
C_{2A}			do	do		
C_3	2		*Capacitor*, paper tubular, 0.05 μfd (±10%), 400 W.V., high temp. wax, 11/32" dia. x 1⅝" long.	Couples plate of V_1 to Control grid No. 1 of V_2.	AE	484
C_4			do	Couples plate No. 1 to Control Grid No. 2 in V_2.	AE	...
C_5	5		Capacitor, paper tubular, 0.1 μfd (±10%), 400 W.V., high temp. wax, 19/32" dia. x 1⅝" long.	Filters M_1 power supply	AE	484
C_6			do	By-passes screen of V_1.	AE	...
C_7			do	Couples Plate No. 2 of V_2 to control grid of V_3.	AE	...
C_8			do	Couples Cathode No. 2 of V_2 to control grid of V_4.	AE	...
C_9			do	By-passes R_3.	AE	...
C_{10}	1		*Capacitor*, paper 3.0 μfd (+15%−10%), 220 W.V., A.C., oil filled, hermetically sealed metal can, 1½" dia. x 3⅝" long.	To correct power factor of M_1 power supply.	AE	RR

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		*Capacitor*, dry electrolytic, 4 sections of 5.0 μfd each (+100%−0%), 450 W.V., metal can, 1⅜" dia. x 2" long.		AE	AF-450
C_{11}			Section 1.	By-passes screens of V_3 and V_4.		
C_{12}			Section 2. Same as Section 1.	Decouples plate circuit of second section of V_2.		
C_{13}			Section 3. Same as Section 1.	Decouples plate circuit of first section of V_2.		
C_{14}			Section 4. Same as Section 1.	Decouples plate circuit of V_1.		
	1		Capacitor, dry electrolytic, 2 sections of 8.0 μfd each (+75%−10%), 500 W.V., metal can, 1½" dia. x 4 7/16" long.		AE	2S-500
C_{15}			Section 1.	Reduces ripple voltage in output of V_5 and V_6.		
C_{16}			Section 2. Same as Section 1.	Eliminates ripple voltage in output of V_5 and V_6.		
C_{17}			Capacitor, tubular, dry electrolytic, 50.0 μfd (+100%−0%), 50 W.V. ⅝" dia. x 1 1/16" long, with mounting brackets.	By-passes R_1.	AE	PRS-50
R_1	1		*Resistor*, 250 ohm (±10%), 10 Watt, fixed, wirewound, ⅜" dia. x 1¾" long.	Provides grid bias for V_3 and V_4.	WI	10
R_2	1		*Resistor*, 4500 ohm (±10%), 5 Watt fixed, wirewound, ⅜" dia. x 1½" long.	Reduces voltage to correct value for screens of V_3 and V_4.	WI	5

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_3	1		*Resistor*, 1000 ohm (±10%), ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Provides grid bias for V_1.	OC	PJ
R_4	1		*Resistor*, 3000 ohms (±10%), ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Provides grid bias for V_2.	OC	PJ
R_5	1		*Resistor*, 5000 ohm (±10%), ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Provides grid bias for second section of V_2.	OC	PJ
R_6	1		*Resistor*, 10,000 ohms (±10%), ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Filters plate voltage of second section of V_2.	OC	PJ
R_7	2		*Resistor*, 25,000 ohm (±10%), ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Filters plate voltage of V_1.	OC	PJ
R_8			do	Filters plate voltage of first section of V_2.	OC	PJ
R_9	2		*Resistor*, 0.1 megohm (±10%), ½ Watt, fixed, insulated composition ¼″ dia. x $\frac{7}{16}$″ long.	Develops audio voltage coupled to control grid of V_4.	OC	PJ
R_{10}			do	Develops audio voltage coupled to control grid of V_3.	OC	PJ

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_{11}	5		*Resistor*, 0.25 megohm (±10%), ½ Watt, fixed, insulated composition ¼" dia. x $\frac{7}{16}$" long.	Develops audio voltage coupled to grid No. 1 of V_2.	OC	PJ
R_{12}			do	Isolates microphone channel control.	OC	PJ
R_{13}			do	Develops audio voltage coupled to grid No. 2 of V_2.	OC	PJ
R_{14}			do	Provides high impedance input for V_2.	OC	PJ
R_{15}			do	Provides high impedance input for V_4.	OC	PJ
R_{16}	3		*Resistor*, 0.5 megohm (±10%), ½ Watt, fixed, insulated composition, ¼" dia. x $\frac{7}{16}$" long.	Isolates phonograph channel control.	OC	PJ
R_{17}			do	Provides high impedance input for V_1.	OC	PJ
R_{18}			do	Provides high impedance input for second section of V_2.	OC	PJ
R_{19}	1		*Resistor*, 1.0 megohm (±10%), ½ Watt, fixed, insulated composition, ¼" dia. x $\frac{7}{16}$" long.	Reduces voltage to correct value for screen of V_1.	OC	PJ
R_{20}	3		*Potentiometer* (0.5 megohm), audio taper, ⅓ Watt, variable, metallized element, 1⅛" dia. x $\frac{17}{32}$" deep.	Controls volume of phonograph channel.	CE	1-010-1635
R_{21}			do	Controls volume of microphone channel.	CE	1-010-1635
R_{22}			do	Permits variation of high frequency response of amplifier.	CE	1-010-1635

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
R_{22}	2		*Resistor*, 2500 ohm (±10%) ½ Watt, fixed, insulated composition, ¼″ dia. x $\frac{7}{16}$″ long.	Vibrator contact damping.	OC	PJ
R_{24}			do	Vibrator contact damping.	OC	PJ
	1		*Shields*, GT tube type, closed top, 1¼″ dia. x 2¼″ high.	Eliminates coupling between V_1 and other components of amplifier.	GO	G-1331-2
S_1	1		*Socket*, tube, 8 contact, octal, 1½″ mtg. centers, stamped 6SJ7GT.	Receives V_1.	AM	MIP-8
S_2	1		*Socket*, tube, 8 contact, octal, 1½″ mtg. centers, stamped 6SL7GT.	Receives V_2.	AM	MIP-8
S_3	2		*Socket*, tube, 8 contact, octal, 1½″ mtg. centers, stamped 6X5GT.	Receives V_5.	AM	MIP-8
S_4			do	Receives V_6.	AM	MIP-8
S_5	2		*Socket*, tube, 8 contact, octal, 1½″ mtg. centers, stamped 6L6GA.	Receives V_3.	AM	RS-8
S_6			do	Receives V_4.	AM	RS-8
S_7	1		*Socket*, tube, 4 contact, 1½″ mtg. centers.	Receives P_4 connecting a-c voltage to M_1.	AM	MIP-4
S_8	1		*Socket*, tube, 4 contact, 1½″ mtg. centers, stamped VIB_1.	Receives VIB_1.	AM	MIP-4

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
S_3	1		*Socket*, tube, 4 contact, 1½" mtg. centers, stamped VIB_2.	Receives VIB_2.	AM	MIP-4
F_1	1		*Fuse*, 3 ampere 250 volts, glass tube type, ¼" dia. x 1¼" long.	Protects Amplifier and Rectifier RA-103 against shorts and overloads.	LI	3AG-3
* F_2	1		*Fuse*, 20 ampere 25 volts, glass tube type, ¼" dia. x 1¼" long.	Same as F_1.	LI	3AG-20
	2		*Fuse post*, No. 1 extractor type, molded bakelite, fits ½" dia. mounting hole, in panel up to $\frac{5}{16}$" thick.	Holds F_1.	LI	1075A
* VIB_1	1		*Vibrator*, full wave, 8 contact interruptor type, 115 cycle output, 32.5 Watts capacity, 6-volt coil, 1½" dia. x $3\frac{3}{16}$" long.	Converts battery voltage to a-c voltage for amplifier.	MA	634C
* VIB_2	1		*Vibrator*, full wave, non-synchronous 4 contact type, 60.0 cycles output 6-volt coil, 1½" dia. x $2\frac{13}{16}$" long.	Converts battery voltage to a-c voltage for M_1.	OA	V-6370 -117 XE
	1		*Pilot light assembly*, with medium SFB Jewell, type No. 20.	Holds pilot light.	DLC	20
* PL	1		*Pilot light*, bayonet base, 6-8 volt, 0.15 ampere. T 3¼ bulb.	Indicates when power is supplied to amplifier.	TE	47
* F_3	1		*Fuse*, 20 ampere 4AG, ¼" dia. x 1¼" long.	Protects Rectifier RA-103 against overloads.	LI	4AG-20

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
SW_1	2		*Switch*, tumbler, single pole single throw.	Turns power to M_1 on or off.	HU	1030
SW_2			do	Turns power to amplifier on or off.	HU	1030
SW_3	1		*Switch*, toggle, double pole double throw, 35 ampere 15-volt d.-c.	Switches power from amplifier to Rectifier RA-103.	CH	8710
T_1	1		*Transformer*, power, primary 117 Volts a.-c. 60 Cycle, secondary (A) 650 V.-C.T. @140 m.a., secondary (B) 6.3 Volts. Primary 6.1-volt battery operation.	Transforms input power voltage to correct value for operation of amplifier.	FR	11678
T_2	1		*Transformer*, power, primary 6-volt d.-c. with full wave non-synchronous vibrator, secondary 117-volt 60 cycles.	Transforms input power voltage to correct value for operation of M_1.	GT	4D13
T_3	1		*Transformer*, audio output, from P.P. 6L6GA's (5000 ohms plate to plate) 250-ohm line.	Couples output and matches impedance of amplifier to loudspeakers.	GT	3C162
L_1	1		*Choke*, 1.3 henries @ 150 m.a. open frame type.	Reduces pulsations in output voltage of V_5 and V_6.	GT	6166
P_1	1		*Plug*, male, single conductor and shield, cable type.	Connects X_1 to amplifier.	CI	M-93
P_4	1		*Plug*, male, four prong cable type.	Connects M_1 to amplifier.	AM	PM-4
* S_{10}	1		*Connector*, male, single contact and shield, chassis type.	Receives S_{11} on Cord CD-1077.	AM	PC-1-M

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
S_{14}	1		*Connector*, male, 15 contact, chassis type.	Receives P_8 on Cord CD-1080 or P_6 on Cord CD-1079.	JO	P-315-DB
* S_{15}	2		*Connector*, female, 2 contact, twist lock, chassis type.	Receives P_2 on Cord CD-1078 or P_3 on Cord CD-1078.	HU	7526
S_{16}			do			
* S_{23}	1		*Connector*, male, 2 prong, chassis type.	Receives P_{13} on Cord CD-1075.	HU	4897
* S_{24}	1		*Connector*, male, 2 prong, twist lock chassis type.	Receives P_{11} on Cord CD-1081 or P_{12} on Cord CD-1076.	HU	9105
* S_{25}	1		*Connector*, female, single conductor and shield, chassis type.	Receives P_1 connecting X_1 to amplifier.	CI	8134
	1		*Chassis*, special.	Mounts components of amplifier.	ST	226B Dwg.
	1		*Cage*, special.	Covers amplifier.	ST	226A Dwg.
	1		*Panel*, special.	Mounts SW_1, SW_2, R_{20}, R_{22}, R_{21}.	ST	226E Dwg.
V_1	1		*Vacuum tube*, type 6SJ7GT.	Amplifies audio voltages generated by T_{55}.	SY	6SJ7GT
* V_2	1		*Vacuum tube*, type 6SL7GT.	First section amplifies audio voltages. Second section acts as phase inverter.	SY	6SL7GT

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* V_3	2		*Vacuum tube*, type 6L6GA.	Develops audio power to drive loudspeakers.	SY	6L6GA
* V_4			do	Same as VT_3.		
* V_5	2		*Vacuum tube*, type 6X5GT.	Converts a-c voltage to d-c voltage.	SY	6X5GT
V_6			do	Same as V_5.		
	1		*Mounting lug strip*, special.	Provides mounting for resistors and capacitors.	MS	223 Dwg.
			Clamp, tube, ring type, 1½" mounting centers.	Secures V_6 in S_4.	CI	
	2		*Clamp*, tube, ring type, 1$\frac{7}{8}$" mounting centers.	Secures V_3 in S_5.	CI	8527
			do	Secures V_4 in S_6.		
	2		*Clamp*, grounding cup type.	Secures and grounds VIB_1 in S_8.	VC	52035
			Clamp, do	Secures and grounds VIB_2 in S_9.		
CD-1074	2		*Cord* CD-1074 loudspeaker extension 200 ft. of wire W-110-B with Hubbell 7506 plug attached to one end. The other end is permanently attached to a Hubbell 7524 receptacle mounted on Reel RL-55.	Connects output of amplifier from Reel RL-55 to loudspeaker.	PD	CD-1074
* P_7	2		*Hubbell Female Connector.*	Connects Cord CD-1074 to S_{19} or S_{20} on either loudspeaker.	HU	7506

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SE. PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
P_8			Same as P_7.			
CD-1075	1		*Cord*, CD-1075 AC extension, 50 ft. of 2 conductor No. 18 stranded R.C. wire with a Hubbell 7057 male cap attached to one end and a Hubbell 7084 attached to the other end.	Connects 115 volts AC 60 cycles external source to S_{23} on switch panel in Chest CH-229.	CW SPECIAL	CD-1075
* P_{13}	1		*Hubbell Female Connector.*	Connects Cord CD-1075 to S_{13} on SP_1.	HU	7084
P_{14}	1		*Hubbell Male Cap.*	Connects to external source 117-V, 60 Cycle AC.	HU	7057
CD-1076	1		*Cord* CD-1076 spare battery, 12 ft. of 2 conductor No. 10 stranded R.C. wire with a Hubbell EC-11709 attached to one end and Mueller No. 21A clips, marked with polarity attached to the other end.	Connects spare battery to S_{24} on panel switch in Chest CH-229.	MS SPECIAL	CD-1076
* P_{12}	1		*Hubbell, female, connects* 20 Amp.	Connects Cord CD-1076 to S_{24} on panel switch.	HU	7224
*	1		*Battery clip* marked +.	Connects to positive part of spare battery.	MU	21A
*	1		*Battery clip*, no marking.	Connects to negative post of spare battery.	MU	21A
CD-1077	1		*Cord* CD-1077 microphone cable consists of 25 ft. of 2 conductor shielded R.C. wire with an Amphenol MC1F connector attached to each end.	Connects T_{55} to amplifier.	TU	CD-1077

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
* S_{11}	2		*Female Connector.*	Connects Cord CD-1077 to S_{10} on amplifier.	AM	MC-1-F
S_{12}			do	Connects Cord CD-1077 to S_{13} on T_{55}.		
CD-1078	2		*Cord* CD-1078 output lead, consists of 6 ft. wire W-110-B with a Hubbell 7508 male cap attached to one end. A Hubbell 7506 female plug attached to the other end.	Connects amplifier output to Reels RL-55 or to loudspeakers.	PD	CD-1078
P_9	2		*Female plug.*	Connects Cord CD-1078 to S_{17} or S_{18} on Reels RL-55 or to S_{19} or S_{20} on loudspeakers.	HU	7506
P_{10}	2		do	do		
P_2	2		*Male cap.*	Connects Cord CD-1078 to either S_{15} or S_{16} on amplifier.	HU	7508
P_3			do	do	HU	7508
CD-1079	1		*Cord* CD-1079 amplifier battery power cable, consists of 5 ft. 2 conductor #10 R.C. stranded wire with #10 closed lugs attached to one end and a Jones S-315CCT (B) plug attached to the other end.	Connects battery power to amplifier when SW_3 is in operate position and P_6 is plugged into S_{14}.	CW	CD-1079
P_6	1		*Female plug,* 15 contact.	Connects Cord CD-1079 to S_{14} on amplifier.	JO	S-315CTT

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
CD-1080	1		*Cord* CD-1080 a-c amplifier power consists of 5 ft. 2 conductor #18 stranded R.C. wire with #10 closed lugs attached to one end and a Jones S-315-CCT (A) plug attached to the other end.	Connects a-c power to amplifier when SW_3 is in operate position and P_5 is plugged into S_{14}.	CW	CD-1080
P_5	1		*Female Plug*, 15 contact.	Connects Cord CD-1080 to S_{14} on amplifier.	JO	S-315CCT-A
CD-1081	1		*Cord*, CD-1081 battery cable consists of 2 conductor #10 stranded rubber covered wire. Conductor #1 is 2½ ft. long with #10 closed lug attached to one end. Conductor #2 is 1½ ft. long with #10 closed lug attached to one end. Other ends of both conductors terminate in Hubbell #7101.	Connects battery in Chest CH-229 to S_{24} on switch panel Chest in CH-229.	CW	CD-1081
P_{11}	1		*Female Plug*, two contact 20 Amp.-Twist lock.	Connects CD-1081 to S_{24} on switch panel.	HU	7101
CH-229	1		*Chest, CH-229* Amplifier and Accessory Chest. This chest is of special design and is described in detail in manufacturer's drawings, photographs and specifications.	Houses all components of PA-5-A except Loudspeakers LS-12-A and spare battery.	SA Special	Dwg. T-5-1
	1		*Name Plate*, 4¼" x 1 3/16".	Identifies Public Address Set PA-5-A.	CN	Dwg. TS-1 Item 47
CH-230-A	1		*Chest, CH-230-A* Loudspeaker Chest. This chest is of special design and is described in detail in manufacturer's drawings, photographs, and specifications.	Houses both Loudspeakers LS-12-A	SA Special	Dwg. TS-2

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
M-405	2		Loudspeaker Stand, M-405.	Supports Loudspeakers LS-12-A.	SA	Dwg. TS-4
	2		Loudspeaker stand head, special design.	Secures loudspeaker stand legs and provides mounting for Loudspeakers LS-12-A.	SA	TS-4 Item 1
	6		Loudspeaker stand leg, special design.	Supports loudspeaker stand head.	SA	TS-4 Item 2
	2		*Mounting*, casting, special design.	Supports mounting bolt and bracket of Loudspeakers LS-12-A.	RA	LS-12 Sub-5
	6		*Bolt, washer, nut assembly*, special design.	Locks loudspeaker legs in loudspeaker stand head.	TS	TS-4 Item 5
RL-55	2		*Reels* RL-55, wood, special design.	Contains Cord CD-1074	SA	Dwg. TS-1
* S_{17}	2		*Connector*, male, twistlock chassis type flush mounted in Reels RL-55.	Receives P_9 or P_{10} on Cord CD-1078.	HU	7506
S_{18}			do	do		
	2		*Crank*, metal, special design.	Rotates Reels RL-55.	MS	TS-1 Item 11
*	2		*Battery binding post* non-corrosive antimonial lead, fits $\frac{11}{16}$" terminal 1" CD x 2" OA.	Provides means for connecting Cord CD-1081 to battery.	MU	103

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A. — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		*Hydrometer set*, consisting of a glass barrel with a rubber bulb on the top and a rubber tube at the bottom. Contains calibrated float.	Test electrolyte in storage battery.	GS	121
RA-103	1		*Rectifier RA-103*, battery charger, copper sulphide rectifier type.	Provides d-c voltage for charging storage batteries.	MA	107
T-55	1		*Microphone*, high impedance, dynamic, output level −53 db. Frequency response 60 to 7000 cycles. Has slide-to-talk switch.	Converts acoustical energy into electrical energy.	TU	9-D
* S_{12}	1		*Connector*. Receives S_{12} on Cord CD-1077.	Connects Cord CD-1077 to Microphone T-55.	AM	PC1M
M-406	1		*Microphone Bracket M-406* metal shoulder support with movable gooseneck for holding microphone.	Supports Microphone T-55.	TU	3-H
LS-12-A	2		Loudspeaker LS-12-A, 4½′ re-entrant horn with 25 watt PM driver unit mounted on a U-bracket with an 8″ dia. plate welded to bottom of U-bracket. Has 500-ohm voice coil transformer in a weather-proof metal box with a Hubbell 7524 and a 7526 receptacle connected in parallel across 500-ohm winding of transformer.	Convert the audio frequency output of amplifier into acoustical power and project it in a specified region.	RA	
T_4	2		*Transformer*, matching type, 500 ohm primary to 15 ohm voice coil.	Couples amplifier to voice coil.	ETC	LS-12-A T-2
T_5			do			

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
S_{20}			Same as S_{19}.			
* S_{21}	2		*Connector*, female, flush type mounting twist lock.	Provide for connecting.	HU	7526
S_{22}			do			
	2		Horn, 4½′ reflex, exponential, air column type.	Concentrates and directs sound into the desired area	RA	Dwg LS-12-A, H-2, H-3, H-4, & H-5
	1		*Pointer knob.*	Microphone channel.	MS	1203
	1		*Pointer knob.*	Phono channel.	MS	....
	1		*Pointer knob.*	Tone control.	MS	....
	2		Metal Cover on end of Loudspeaker LS-12-A for protecting parts from water and physical damage.	Protects speaker components.	RA	
	2		*Grommet*, rubber 9/8″ dia. with ½″ center hole.	To prevent shorting of wires to chassis.	MS	Special
	1		Flexarm flexible gooseneck.	Supports Microphone T-55.	TU	MX-125
SW_4	1		*Switch*, slide type single circuit.	Connects Microphone T-55 on and off.	TU	64T-2
T_7	1		*Transformer* primary 50 ohms impedance at 1000 c.p.s. Secondary 100,000 ohms.	Increases voltage produced by voice coil.	TU	65T-9

*Spare parts furnished with equipment.

44. LIST OF REPLACEABLE PARTS FOR PUBLIC ADDRESS SET PA-5-A — (Continued).

Ref. No.	*Total quantity in equipment*	*Signal Corps stock No.*	*Name of part and description*	*Function*	*Mfr's code*	*Contr's drawing or part No.*
	1		*Diaphragm assembly* consisting of aluminum diaphragm and retaining parts.	Energizes coil when actuated by sound waves.	TU	MX-230
	2		Battery, storage battery.	Supplies battery power to amplifier.		
	1		*Switch panel*, wood 9″ x 4″ x ½″ Special.	Mounts S_{23}, S_{24}, SW_3, F_1, and F_2.	SA	
			Clamp for horn rim.	Clamps horn rim of Loudspeakers LS-12-A to Chest CH-229.	MS	

45. INDEX OF MANUFACTURERS FOR PUBLIC ADDRESS SET PA-5-A.

Abbreviation	*Name and address*
AE	Aerovox Corp., New Bedford, Mass.
WI	Wirt Resistor Co., Philadelphia, Pa.
OC	Ohio Carbon Co., 12508 Berea Rd., Cleveland, Ohio.
CE	Centralab, 900 E. Keefe Ave., Milwaukee, Wis.
GO	Fred F. Goat Co., 314 Dean St., Brooklyn, N. Y.
AM	American Phenolic Corp., 1832 S. 54th Ave., Chicago, Ill.
LI	Littelfuse, Inc., 4757 Ravenswood Ave., Chicago, Ill.
MA	P. R. Mallory Co., Indianapolis, Ind.
DLC	Dial Light Co. of America, 90 West St., New York, N. Y.
TE	Tung Sol Lamp Works, Empire State Bldg., New York, N. Y.
HU	Harvey Hubbell, Bridgeport, Conn.
FR	Freed Transformer Co., 72 Springs St., New York, N. Y.
GT	General Transformer Co., 1250 W. Van Buren St., Chicago, Ill.
CI	Cinch Mfg. Co., 2335 W. Van Buren St., Chicago, Ill.
JO	Howard B. Jones Co., 2460 George St., Chicago, Ill.
ST	Star Tool & Mfg. Co., 1456 Chestnut Ave., Hillside, N. J.
SY	Sylvania Electric Products, Emporium, Pa.
MS	Mark Simpson Mfg. Co., 188 W. 4th St., New York, N. Y.
PD	Phelps Dodge Copper Products, 40 Wall St., New York, N. Y.
CW	Cornish Wire Co., 15 Park Row, New York, N. Y.
MU	Mueller Electric Co., 1583 E. 31st St., Cleveland, Ohio.
TU	Turner Co., Cedar Rapids, Iowa
SA	Standard Arts, 543 Union St., Brooklyn, N. Y.
CN	Crowe Name Plate & Mfg. Co., 3701 Ravenswood Ave., Chicago, Ill
GS	General Scientific Equip. Co., 1346 W. Somerset St., Philadelphia, Pa.
ETC	Electronic Transformer, 515 W. 29th St., New York, N. Y.
OA	Oak Mfg. Co., 1260 Clybourn Ave., Chicago, Ill.
RA	Racon Electric Co., 52 E. 19th St., New York, N Y.

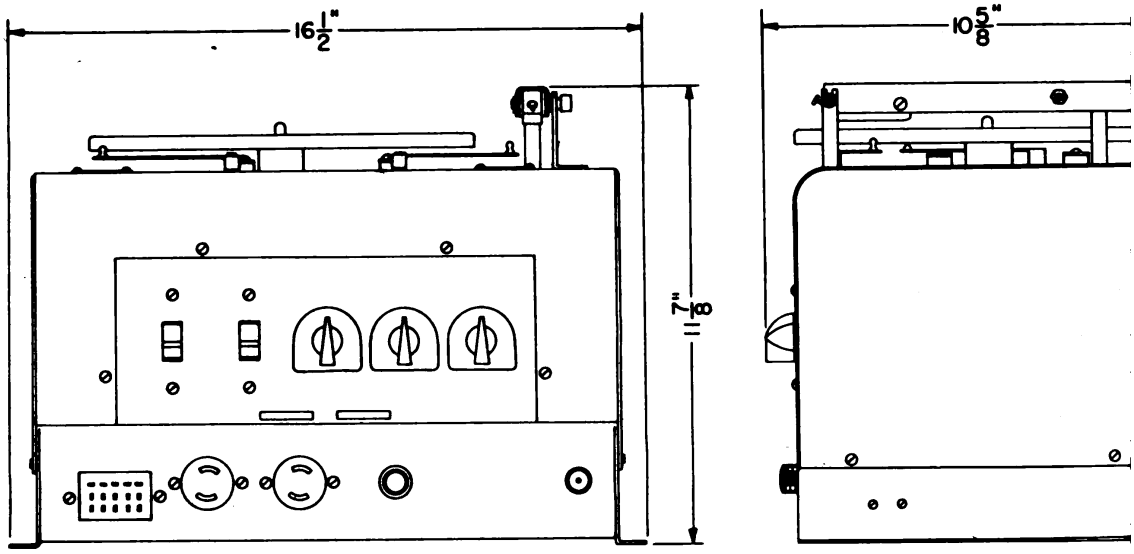

Figure 20. Amplifier and Record Player BC-1292, dimensional diagram

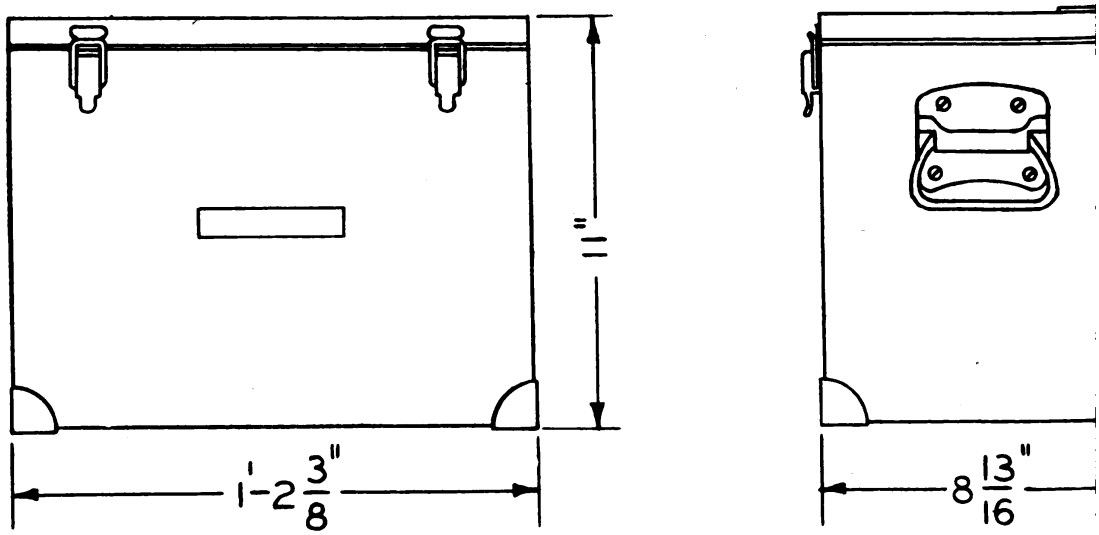

Figure 21. Box BX-59, spare battery box, dimensional diagram

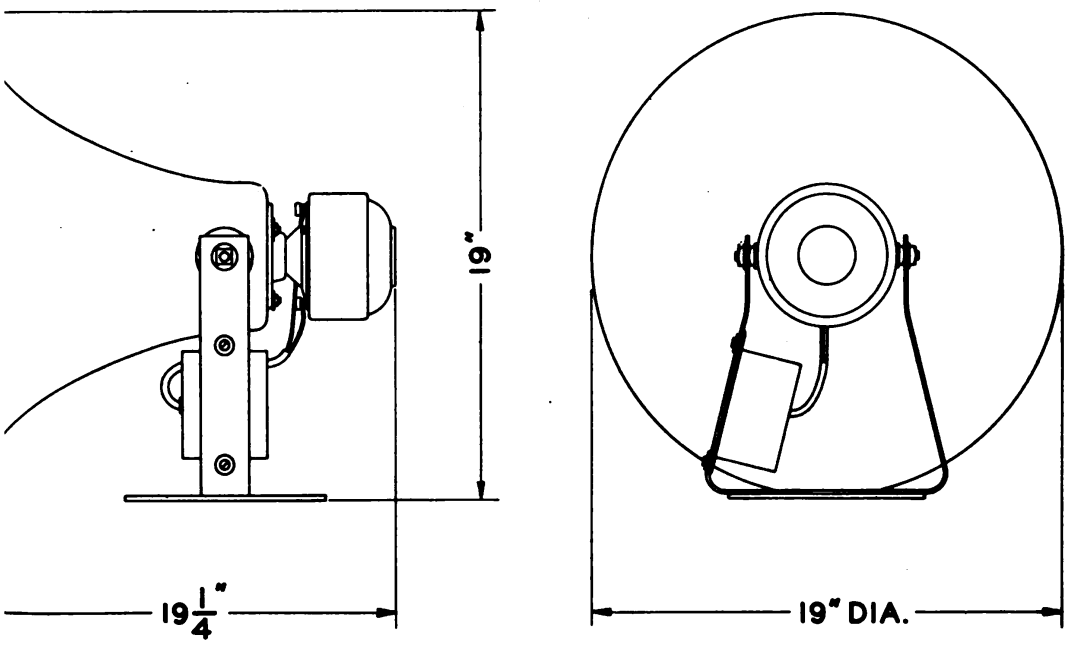

Figure 22. Loudspeaker LS-12, dimensional diagram

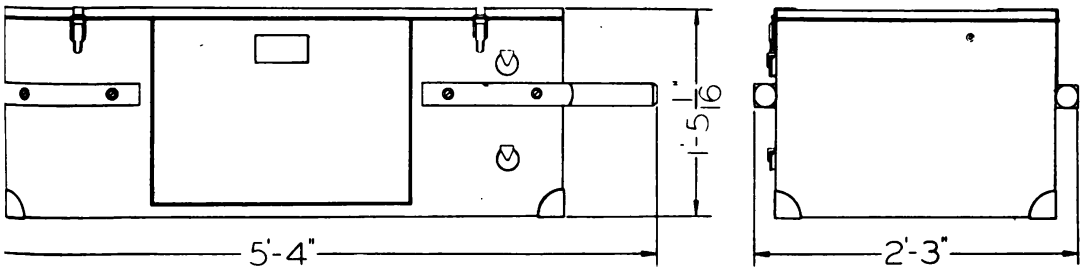

Figure 23. Chest CH-229, dimensional diagram

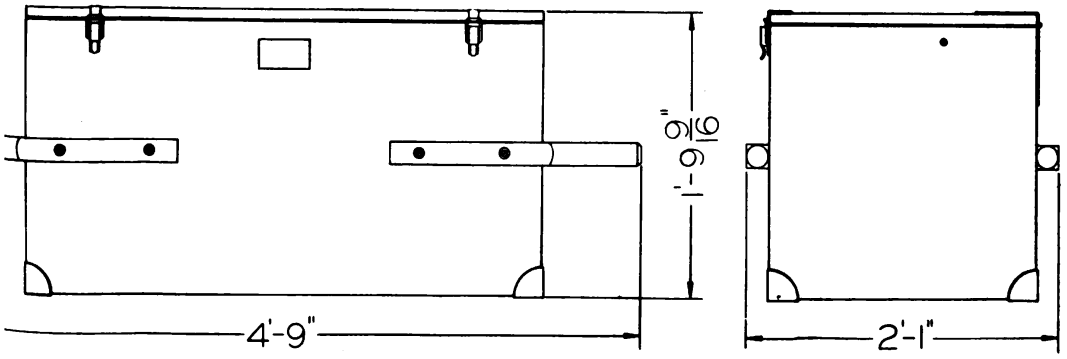

Figure 24. Chest CH-230, dimensional diagram

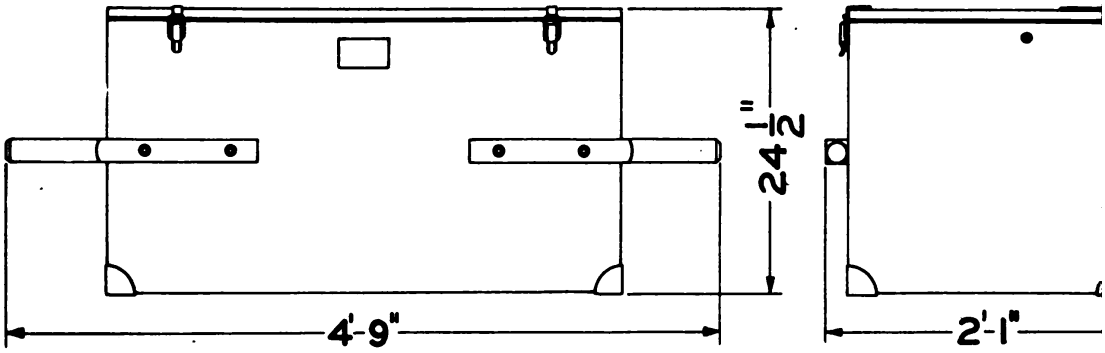

Figure 25. Chest CH-230-A, dimensional diagram

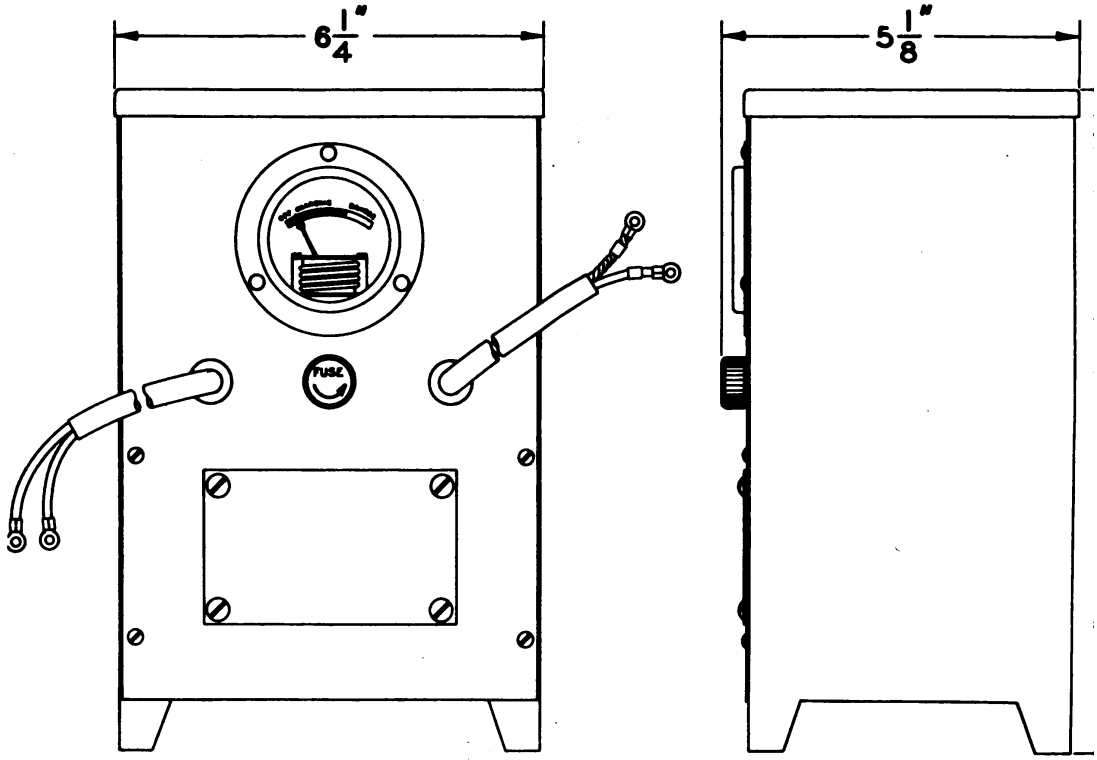

Figure 26. Rectifier RA-103, dimensional diagram