TM 11-2648A

INSTRUCTION BOOK
FOR
VIBRATOR PACK PP-68B/U

MANUFACTURED BY
AMERICAN TELEVISION & RADIO CO.
ORDER NO. 22701-PHILA-51
1953

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WARNING

HIGH VOLTAGE

is used in the operation

of this equipment.

DEATH ON CONTACT

may result if operating personnel fail

to observe safety precautions.

ARTIFICIAL RESPIRATION

GENERAL PRINCIPLES

1. Seconds count! Begin at once! Don't take time to move the victim unless you must. Don't loosen clothes, apply stimulants or try to warm the victim. Start resuscitation! Get air in the lungs! You may save a life!

2. Place the victim's body in a prone position, so that any fluids will drain from the respiratory passages. The head should be extended and turned sideward *never flexed forward;* the chin shouldn't sag, since obstruction of the respiratory passages may occur.

3. Remove any froth or debris from the mouth with your fingers. Draw the victim's tongue forward.

4. Begin artificial respiration. Continue it rhythmically and without any interruption until natural breathing starts or the victim is pronounced dead. Try to keep the rhythm smooth. Split-second timing is not absolutely essential.

5. When the victim starts breathing, or when additional help is available loosen the clothing; remove it, if it's wet; keep the victim warm. Shock should receive adequate attention. Don't interrupt the rhythmical artificial technique for these measures. Do them only when you have help or when natural breathing has started.

6. When the victim is breathing, adjust your timing to assist him. Don't fight his efforts to breathe. Synchronize your efforts with his. After resuscitation, keep him lying down until seen by a physician or until recovery seems certain.

7. Don't wait for mechanical resuscitation! If an approved model is available, use it, but, since mechanical resuscitators are only slightly more effective than properly performed "push-pull" manual technique, *never* delay manual resuscitation for it.

BACK-PRESSURE ARM LIFT METHOD

1. *Position of Victim.* Place the victim in the prone (face-down) position. Bend his elbows; place one hand upon the other. Turn his face to one side, placing his cheek upon his hands.

2. *Position of Operator.* Kneel on your left or right knee, at the victim's head, facing him. Your knee should be at the side of the victim's head close to his forearm, your foot should be near his elbow. Kneel on both knees if you find it more comfortable, with one knee on each side of the head. Place your hands on the flat of the victim's back so that their heels are just below the lower tip of his shoulder blades. With the tip of your thumbs touching spread your fingers downward and outward. (See A)

3. *Compression Phase.* Rock forward until your arms are approximately vertical and allow the weight of the upper part of your body to exert a slow, steady, even, downward pressure upon your hands. This forces air out of the lungs. Keep your elbows straight and press almost directly downward on the back. (See B)

4. *Expansion Phase.* Release the pressure, avoid any finish thrust, and commence to rock backward slowly. Place your arms upon the victim's arms just above the elbows, and draw his arms upward and toward you. Apply just enough lift to feel resistance and tension at the victim's shoulders.

Don't bend your elbows. As you rock backward, the victim's arms will be drawn toward you. (The arm lift expands the chest by pulling on the chest muscles, arching the back and relieving the weight on the chest.) Drop the arms gently to the ground or floor. This completes the cycle. (See C and D). Now, repeat the cycle.

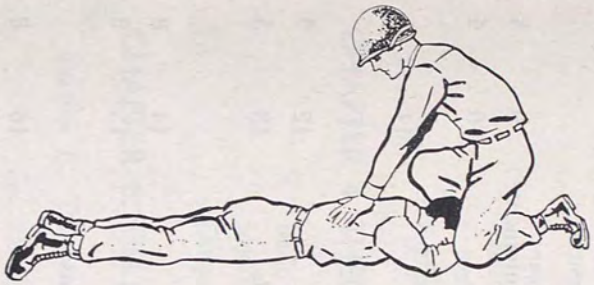
5. *Cycle Timing and Rhythm.* Repeat the cycle 10 to 12 times per minute. Use a steady uniform rate of Press, Release, Lift, Release. Longer counts of about equal length should be given to the "Press" and "Lift" steps of the compression and expansion phases. Make the "Release" periods of minimum duration.

6. *Changing Position or Operator.*

(*a*) Remember that you can use either or both knees or can shift knees during the procedure, provided you don't break the rhythm. Observe how you rock forward with the back-pressure and backward with the arm-lift. The rocking motion helps to sustain the rhythm and adds to the ease of operation.

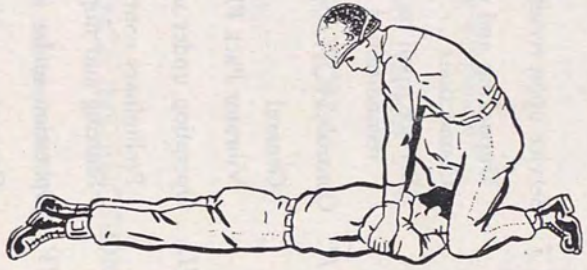
(*b*) If you tire and another person is available, you can "take turns." Be careful not to break the rhythm in changing. Move to one side and let your replacement come in from the other side. Your replacement begins the "Press-Release" after one of the "Lift-Release" phases, as you move away.

TM AR-3

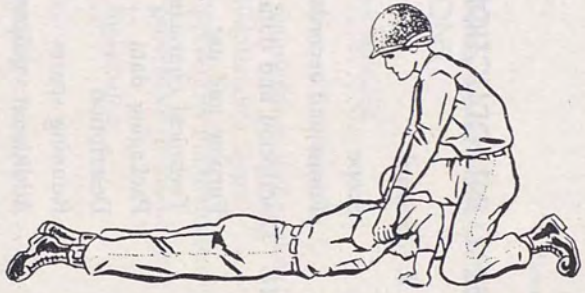


A **Position of operator and victim**

B **Compression phase**



C **Expansion phase (arm lift)**



D **Expansion phase (arm release)**

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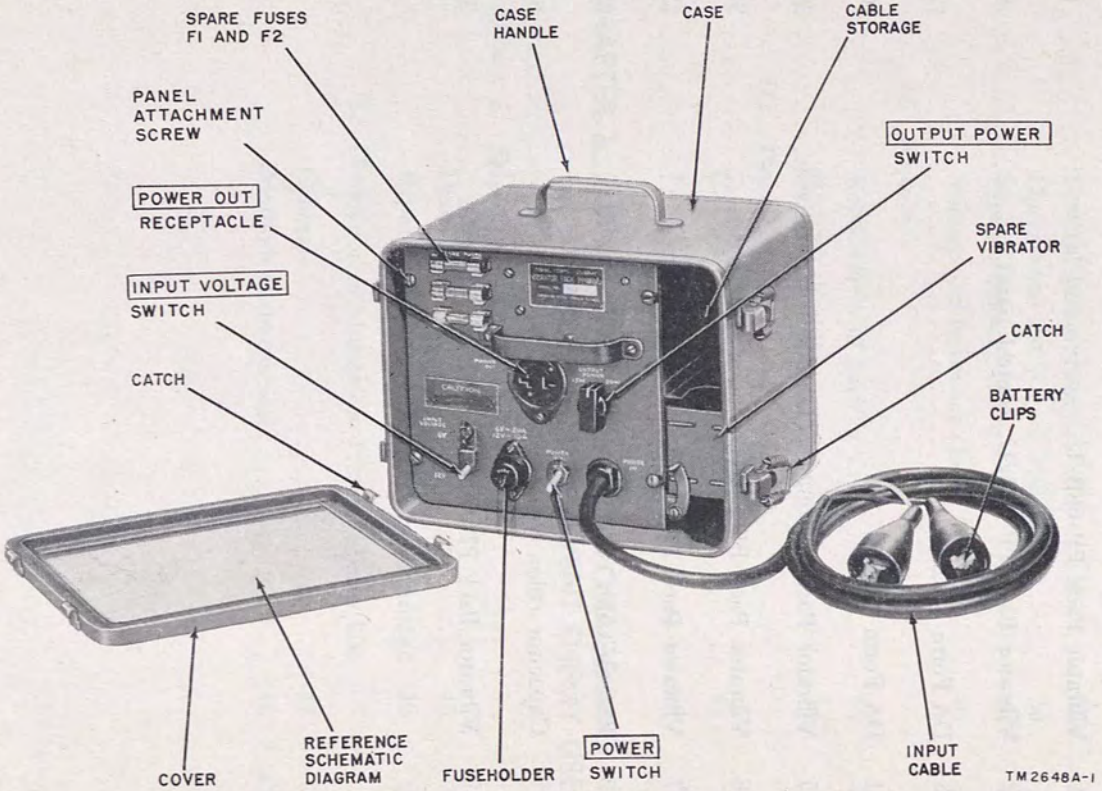


Figure 1. Vibrator Pack PP–68B/U.

Note. This instruction book will be replaced by TM 11–2648A, which, when published, will be listed in SR 310–20–4.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This instruction book contains information for the installation, operation, maintenance, and repair of Vibrator Pack PP–68B/U (fig. 1).

2. Forms and Records

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

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745–45–5.

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

c. DA AGO Form 11–238, Operator First Echelon Maintenance Check List for Signal Corps Equipment—Radio Communication, Direction Finding, Carrier, Radar, will be prepared in accordance with instructions on the back of the form (fig. 3).

d. DA AGO Form 11–239, Second and Third Echelon Maintenance Check List for Signal Corps Equipment—Radio Communication, Direction Finding, Carrier, Radar, will be prepared in accordance with instructions on the back of the form (fig. 4).

e. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Vibrator Pack PP–68B/U (fig. 1) is a portable vibrator-type power supply that derives power from a 6- or 12-volt storage battery to supply a

100- to 110-volt 60-cycle output. Provision is made for continuous high (50-watt) or low (15-watt) power operation of the vibrator pack. The unit may be used to power Tube Tester I–177–(*), Electron Tube Test Set TV–7/U, or other electrical equipment that operates on 110-volt 60-cycle power with a power dissipation not exceeding 50 watts.

4. Technical Characteristics

Nominal input voltage	6.3 or 12.6 volts dc.
Rated input current	6.6 amperes at 6.3 volts dc for 15-watt output. 15.0 amperes at 6.3 volts dc for 50-watt output. 2.5 amperes at 12.6 volts dc for 15-watt output. 7.0 amperes at 12.6 volts dc for 50-watt output.
Rated output voltage	100 to 110 volts 60 cycles (under load).
Normal operating temperatures	From —40° C (—40° F) to +55° C (+ 131° F).
Weight	29-½ lbs.

5. Packaging Data

Each Vibrator Pack PP–68B/U is packed in an individual carton 13-½ inches high, 15 inches wide, and 12-½ inches deep. The net weight of each unit is 29-½ pounds. A spare vibrator is in the spare vibrator compartment of the case. The battery cable is wound in a large coil to fit in the battery cable compartment of the case.

6. Description

Vibrator Pack PP–68B/U (fig. 1) is housed in a steel case. The overall dimensions are 9-⅝ inches high by 11-¼ inches wide by 8-⅝ inches deep. The entire case is made of welded steel construction. The power supply case is a permanent housing for the chassis assembly and spare vibrator. The case is fitted with watertight cover plate and handle for carrying.

7. Running Spares

A group of running spares is supplied with each unit. The spares are provided for normally expendable items such as fuses and vibrator. Running spares for Vibrator Pack PP–68B/U are as follows:

Fuse, 10 amperes (1)
Fuse, 20 amperes (1)
Vibrator (1)

8. Additional Equipment Required

Vibrator Pack PP–68B/U requires a 6- or 12-volt storage battery and the equipment which it powers.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

9. Unpacking and Checking New Equipment

Caution: Rough handling during the unpacking process may damage the equipment. Therefore, take every precaution to prevent damage. If possible, unpack the equipment in a location that is free from dust, dirt, and moisture.

a. Unpacking.

(1) Open the flaps on the top of the outer carton.

(2) Open the moisture-vaporproof bag by slitting it along the edge of the seal.

(3) Remove the inner carton that contains the equipment. Because of the weight of the vibrator pack, it may be easier to tip the carton on its side. The equipment can be pulled out without lifting. To prevent scratching the finish, place a cardboard strip under the vibrator pack while this is being done.

b. Inspection (fig. 1).

(1) Remove the case cover by unlocking the four catch fasteners.

(2) Unwind the input cable and inspect for damage.

(3) Remove the spare vibrator from the spare vibrator compartment and inspect for broken pins.

(4) Remove the chassis assembly from the case. The chassis assembly is held in position by four #10–32 screws. Check the entire chassis assembly for damaged resistors, broken leads, plugs, bent parts, etc. Make sure that the vibrator is seated firmly in its socket.

Note. Save the original packing cases and containers for both export and domestic shipments. They can be used again when the equipment is repacked for storage or shipment.

10. Connections

Caution: Before connecting the vibrator pack to a 6- or 12-volt storage battery, make sure that the POWER switch is set at OFF. If power is applied to the vibrator pack before the equipment to be powered is plugged into the POWER OUT receptacle and before power is turned on in that

equipment, excessive output voltage will be developed in the vibrator pack and may cause damage to the filter capacitors and the vibrator in the vibrator pack.

a. Connect the battery clips of the input cable to the terminals of a 6- or 12-volt storage battery. Polarity is not important. Either battery clip may be connected to either terminal of the storage battery.

b. Plug the equipment to be powered into the POWER OUT receptacle of the vibrator pack.

11. Service upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions outlined in paragraph 9 for unpacking and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in wiring of the equipment. If any changes have been made, note the changes in the instruction book (preferably on the schematic diagram) with the order number and serial number of the affected equipment.

c. Make connections as described in paragraph 10.

Section II. CONTROLS

12. General

Haphazard or improper setting of the vibrator pack controls can cause damage to the vibrator pack and to the equipment powered by it, or blow a fuse in the vibrator pack. Therefore, it is important to know the functions of all panel controls on the unit. Operation is discussed in section III of this chapter.

13. Vibrator Pack PP-68B/U Controls (fig. 2)

The following chart lists the front panel controls of the vibrator pack and indicates the function of each control.

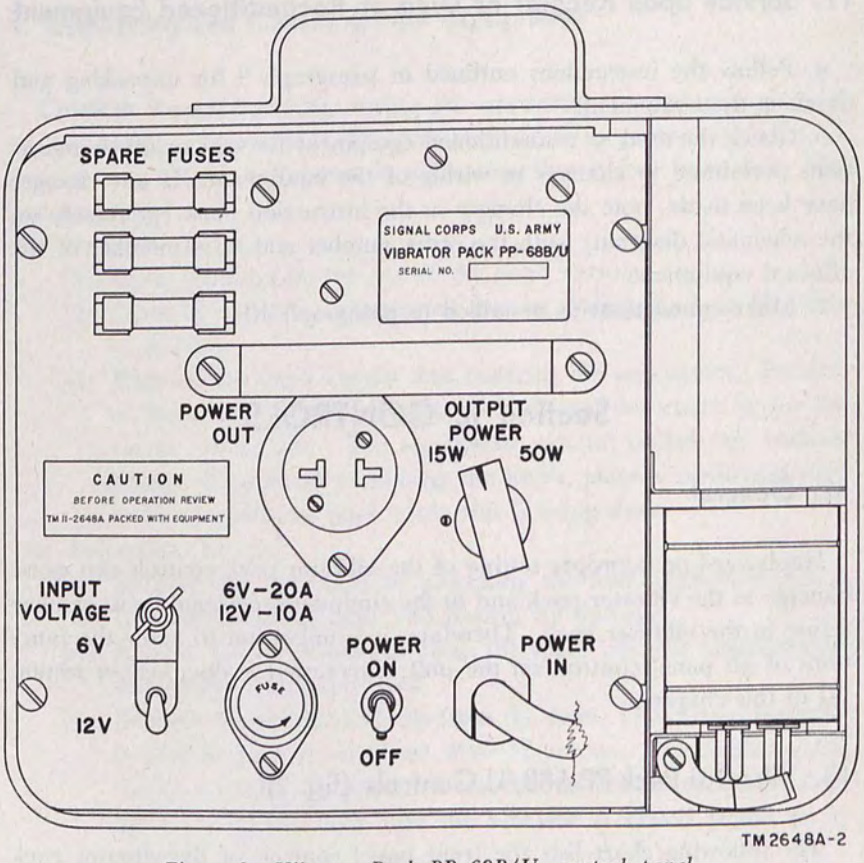


Figure 2. Vibrator Pack PP–68B/U, control panel.

13. Vibrator Pack PP-68B/U Controls (fig. 2) (contd)

Control	Function
POWER switch (S1)	Controls application of direct-current (dc) power to primary circuits of vibrator pack. In ON position, power pack is turned on. In OFF position, all power to power pack is turned off.
POWER FUSES (F1 or F2)	Protects equipment and main power source. 20-ampere fuse (F1) is used when equipment is operated from 6-volt battery. 10-ampere fuse (F2) is used when equipment is operated from 12-volt battery.
INPUT VOLTAGE switch (S2)	6V position is used for 6-volt operation; 12V position is used for 12-volt operation. If 6V position is used for operation from 12-volt storage battery, *either fuse will blow, or actuating coil of vibrator will burn out, or both.* If 12V position is used with 6-volt storage battery, vibrator will not operate. Wing nut and clamp are used to prevent accidental switching from 12V to 6V when 12-volt storage battery is used.
OUTPUT POWER switch (S3)	15W position is used for equipments with 15-watt power dissipation. 50W position is used for equipments with 50-watt power dissipation. If 50W position is used for 15-watt equipments, excessive voltage will be applied to those equipments and damage to those equipments may result. If 15W position is used for 50-watt equipments, insufficient voltage will be put out by vibrator pack and equipment probably will not operate.

Section III. OPERATION UNDER USUAL CONDITIONS

Note. Before proceeding with the adjustments in this section, make sure that the system is connected properly (par. 10).

14. Preliminary Control Settings (fig. 2)

a. Set the INPUT VOLTAGE switch at 6V if a 6-volt storage battery is used, or at 12V if a 12-volt storage battery is used. When the 12V position is used, secure the switch in this position with the wingnut and catch.

b. For 6-volt operation, use the 20-ampere fuse (F1); for 12-volt operation, use the 10-ampere fuse (F2). *If the 10-ampere fuse is used for 6-volt operation, the fuse may burn out. If the 20-ampere fuse is used for 12-volt operation, it will provide inadequate protection to the vibrator pack.*

c. Set the OUTPUT POWER switch at 15W for 15-watt equipment or at 50W for a 50-watt equipment such as Test Set I–177–(*).

d. Insert the plug of the power cord of the equipment to be powered in the POWER OUT receptacle. Set the switch of the equipment to be powered to ON. Never turn power off on this equipment. Always turn power off at the vibrator pack. Otherwise excessive voltage and possible damage to the vibrator pack will result.

15. Starting and Stopping Procedures

Note. If, during the starting procedure, an abnormal result is obtained, refer to the equipment performance check list (par. 30).

a. Starting. Set the POWER switch of the vibrator pack to ON. An audible hum will be heard in the power pack. This is a normal condition and results from the mechanical operation of the vibrator. The powered equipment should operate within approximately 30 seconds.

b. Stopping. Set the POWER switch of the vibrator pack to OFF.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

16. General

The operation of Vibrator Pack PP–68B/U may be difficult in regions where extreme cold, heat, humidity and moisture, sand conditions, etc., prevail. In the following paragraphs, instructions are given on procedures for minimizing the effects of unusual operating conditions.

17. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

a. Handle the equipment carefully.

b. Install the equipment in a heated shelter to keep it warm and dry.

c. When equipment that has been exposed to the cold is brought into a warm room, it will start sweating, until it reaches room temperature. This condition also occurs when equipment warms up during the day after exposure during a cold night. When the equipment has reached room temperature, dry it thoroughly.

18. Operation in Tropical Climates

When operated in tropical climates, the equipment may be installed in tents, huts, or, when necessary, in underground dugouts. When equipment is set up in swampy areas, it will be subjected to moisture conditions more acute than normal. Ventilation is usually very poor, and the high relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than that of the surrounding air. Make frequent checks for moisture. Dry the equipment thoroughly.

19. Operation in Desert Climates

a. Conditions similar to those encountered in tropical climates often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. The main problem that arises with equipment operation in desert areas is the large amount of sand, dust, or dirt that enters the equipment. The ideal preventive precaution is to house the equipment in a dustproof shelter. Since such a shelter is seldom available, the next best precaution is to make the shelter as dustproof as possible with available materials. Hang wet sacking over the windows and doors, cover the inside walls with heavy paper, and secure the side walls of tents with sand to prevent their flapping in the wind.

c. Never tie power cords or other wiring connections to either the inside of outside of tents. Desert areas are subject to sudden wind squalls that may jerk the connections loose or break the lines.

d. Keep the equipment as free from dust as possible. Make frequent preventive maintenance checks (ch. 3). Excessive amounts of dust, sand, or dirt that come in contact with moving parts of the equipment cause damage.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

20. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from occurring. It is important that personnel perform preventive maintenance operations carefully. See AR 750–5, Maintenance Responsibilities and Shop Operation.

21. General Preventive Maintenance Techniques

a. Use #0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with Standard Cleaning Solvent, (Sig C spec No. 75–000) then wipe the parts with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride; then wipe them dry with a dry cloth.

Caution: Repeated contact of carbon tetrachloride with the skin or prolonged breathing of the fumes is dangerous. Make sure adequate ventilation is provided.

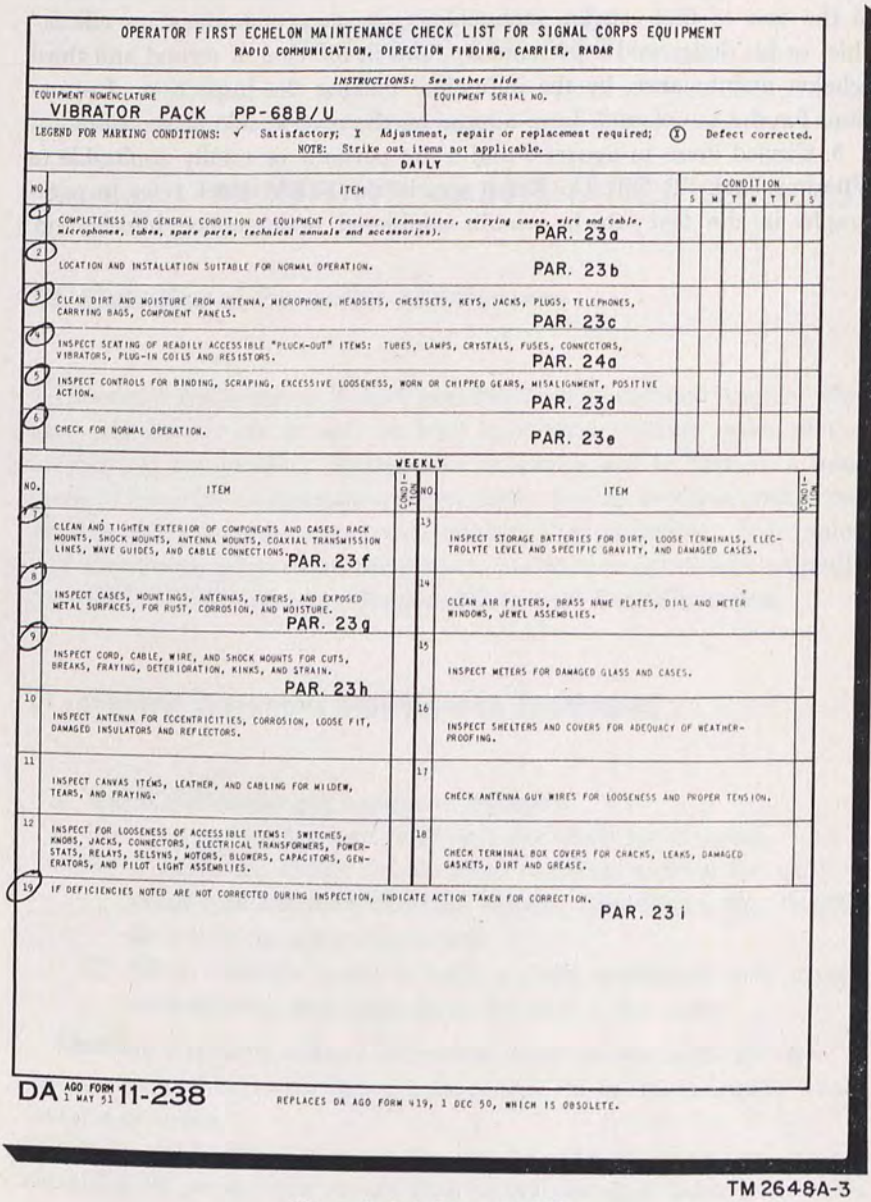
c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch to remove dust from inaccessible places; be careful, however, or mechanical damage from the air blast may result.

d. For further information on preventive maintenance techniques, refer to TB SIG 178, Preventive Maintenance Guide for Radio Communication Equipment.

22. Use of Preventive Maintenance Forms (figs. 3 and 4)

a. The decision as to which items on DA AGO Forms 11–238 and 11–239 are applicable to this equipment is a tactical decision to be made in the case of first echelon maintenance, by the communication officer/chief or his designated representative, and in the case of second and third echelon maintenance, by the individual making the inspection. Instructions for the use of each form appear on the reverse side of the form.

b. Circled items in figures 3 and 4 are partially or totally applicable to Vibrator Pack PP–68B/U. References in the ITEM block refer to paragraphs in the text which contain additional maintenance information.



OPERATOR FIRST ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT
RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE: VIBRATOR PACK PP-68B/U
EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; ⓧ Defect corrected.
NOTE: Strike out items not applicable.

DAILY

NO.	ITEM	CONDITION S	M	T	W	T	F	S
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (*receiver, transmitter, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories*). PAR. 23a							
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 23b							
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR. 23c							
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR. 24a							
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 23d							
6	CHECK FOR NORMAL OPERATION. PAR. 23e							

WEEKLY

NO.	ITEM	CONDITION	NO.	ITEM	CONDITION
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR. 23f		13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES.	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 23g		14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES.	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 23h		15	INSPECT METERS FOR DAMAGED GLASS AND CASES.	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.		16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING.	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING.		17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION.	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES.		18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE.	

19 IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 23i

DA AGO FORM 1 MAY 51 11-238 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE.

TM 2648A-3

Figure 3. DA Form 11-238.

SECOND AND THIRD ECHELON MAINTENANCE CHECK LIST FOR SIGNAL CORPS EQUIPMENT

RADIO COMMUNICATION, DIRECTION FINDING, CARRIER, RADAR

INSTRUCTIONS: See other side

EQUIPMENT NOMENCLATURE: VIBRATOR PACK PP-68B/U

EQUIPMENT SERIAL NO.

LEGEND FOR MARKING CONDITIONS: ✓ Satisfactory; X Adjustment, repair or replacement required; ⓧ Defect corrected.
NOTE: Strike out items not applicable.

NO.	ITEM	COND	NO.	ITEM	COND
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (*receivar, transmitter, carrying cases, wire and cable, microphones, tubes, spare parts, technical manuals and accessories*). PAR. 23a		19	ELECTRON TUBES - INSPECT FOR LOOSE ENVELOPES, CAP CONNECTORS, CRACKED SOCKETS; INSUFFICIENT SOCKET SPRING TENSION; CLEAN DUST AND DIRT CAREFULLY; CHECK EMISSION OF RECEIVER TYPE TUBES.	
2	LOCATION AND INSTALLATION SUITABLE FOR NORMAL OPERATION. PAR. 23b		20	INSPECT FILM CUT-OUTS FOR LOOSE PARTS, DIRT, MISALIGNMENT AND CORROSION.	
3	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONE, HEADSETS, CHESTSETS, KEYS, JACKS, PLUGS, TELEPHONES, CARRYING BAGS, COMPONENT PANELS. PAR. 23c		21	INSPECT FIXED CAPACITORS FOR LEAKS, BULGES, AND DISCOLORATION. PAR. 24b	
4	INSPECT SEATING OF READILY ACCESSIBLE "PLUCK-OUT" ITEMS: TUBES, LAMPS, CRYSTALS, FUSES, CONNECTORS, VIBRATORS, PLUG-IN COILS AND RESISTORS. PAR. 24a		22	INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR LOOSE MOUNTINGS; BURNED, PITTED, CORRODED CONTACTS; MISALIGNMENT OF CONTACTS AND SPRINGS; INSUFFICIENT SPRING TENSION; BINDING OF PLUNGERS AND HINGE PARTS.	
5	INSPECT CONTROLS FOR BINDING, SCRAPING, EXCESSIVE LOOSENESS, WORN OR CHIPPED GEARS, MISALIGNMENT, POSITIVE ACTION. PAR. 23d		23	INSPECT VARIABLE CAPACITORS FOR DIRT, MOISTURE, MISALIGNMENT OF PLATES, AND LOOSE MOUNTINGS.	
6	CHECK FOR NORMAL OPERATION. PAR. 23e		24	INSPECT RESISTORS, BUSHINGS, AND INSULATORS, FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE. PAR. 24c	
7	CLEAN AND TIGHTEN EXTERIOR OF COMPONENTS AND CASES, RACK MOUNTS, SHOCK MOUNTS, ANTENNA MOUNTS, COAXIAL TRANSMISSION LINES, WAVE GUIDES, AND CABLE CONNECTIONS. PAR. 23f		25	INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR CORROSION, DIRT AND LOOSE CONTACTS. PAR. 24b	
8	INSPECT CASES, MOUNTINGS, ANTENNAS, TOWERS, AND EXPOSED METAL SURFACES, FOR RUST, CORROSION, AND MOISTURE. PAR. 23g		26	CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES, AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE.	
9	INSPECT CORD, CABLE, WIRE, AND SHOCK MOUNTS FOR CUTS, BREAKS, FRAYING, DETERIORATION, KINKS, AND STRAIN. PAR. 23h		27	INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	
10	INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.		28	CHECK SETTINGS OF ADJUSTABLE RELAYS.	
11	INSPECT CANVAS ITEMS, LEATHER, AND CABLING FOR MILDEW, TEARS, AND FRAYING.		29	LUBRICATE EQUIPMENT IN ACCORDANCE WITH APPLICABLE DEPARTMENT OF THE ARMY LUBRICATION ORDER.	
12	INSPECT FOR LOOSENESS OF ACCESSIBLE ITEMS: SWITCHES, KNOBS, JACKS, CONNECTORS, ELECTRICAL TRANSFORMERS, POWERSTATS, RELAYS, SELSYNS, MOTORS, BLOWERS, CAPACITORS, GENERATORS, AND PILOT LIGHT ASSEMBLIES.		30	INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS, FOR BRUSH WEAR, SPRING TENSION, ARCING, AND FITTING OF COMMUTATOR.	
13	INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, ELECTROLYTE LEVEL AND SPECIFIC GRAVITY, AND DAMAGED CASES.		31	CLEAN AND TIGHTEN CONNECTIONS AND MOUNTINGS FOR TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS. PAR. 24e	
14	CLEAN AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS, JEWEL ASSEMBLIES.		32	INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS, AND RHEOSTATS FOR OVERHEATING AND OIL-LEAKAGE. PAR. 24f	
15	INSPECT METERS FOR DAMAGED GLASS AND CASES.		33	BEFORE SHIPPING OR STORING - REMOVE BATTERIES.	
16	INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHERPROOFING.		34	INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.	
17	CHECK ANTENNA GUY WIRES FOR LOOSENESS AND PROPER TENSION.		35	INSPECT BATTERIES FOR SHORTS AND DEAD CELLS.	
18	CHECK TERMINAL BOX COVERS FOR CRACKS, LEAKS, DAMAGED GASKETS, DIRT AND GREASE.		36	INSPECT FOR LEAKING WATERPROOF GASKETS, WORN OR LOOSE PARTS. PAR. 24g	
			37	MOISTURE AND FUNGIPROOF PAR. 24h	
38	IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. PAR. 24i				

DA AGO FORM 1 MAY 51 11-239 REPLACES DA AGO FORM 419, 1 DEC 50, WHICH IS OBSOLETE. 16-44367-1

TM2648A-4

Figure 4. A Form 11–239.

23. Performing Exterior Preventive Maintenance

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

a. Check to see that the equipment is complete and in satisfactory condition (fig. 1).

b. Check the location of the equipment to assure that it will be kept warm (if operated in a cold climate), dry, and free from sand and dirt.

c. Remove dirt and moisture from all front panel controls (fig. 1).

d. Check controls for binding, scraping, or excessive looseness (fig. 1).

e. Check for normal operation. If abnormal results occur at any point in the operating procedure, refer to the equipment performance checklist (par. 30).

f. Clean the exterior of the case and check power cable connections.

g. Check the case and all exposed metal surfaces for rust, corrosion, and moisture.

h. Inspect the input power cable for cuts, breaks, fraying, deteriorations, kinks, and strain.

i. If deficiencies noted are not corrected during inspection, indicate on DA Form 11–238 the action taken for correction.

24. Performing Interior Preventive Maintenance

Caution: Disconnect the input power cable from the storage battery, and the cable that is plugged into the POWER OUT receptacle before performing the following operations. Upon completion, reconnect the power input and output cables and check for satisfactory operation (par. 38).

a. Inspect the seating of the vibrator in its socket (fig. 7).

b. Inspect fixed capacitors for leaks, corrosion, and dirt (figs. 5, 6, and 7).

c. Inspect resistors for cracks, blistering, discoloration, and moisture. Pay particular attention to the condition of the voltage dropping resistor R3 (fig. 5).

d. Clean and tighten switches and interior of chassis (fig. 5).

e. Clean and tighten connections and mountings for the transformer and choke coils (fig. 5).

f. Inspect the transformer, filter chokes, and resistors for overheating.

g. Inspect for leaking waterproof gaskets and worn or loose parts (fig. 5).

h. Check for adequacy of moistureproofing and fungiproofing (par. 25).

i. If deficiencies noted are not corrected during inspection, indicate on DA Form 11–239 the action taken to initiate correction.

Section II. WEATHERPROOFING

25. Weatherproofing

a. General. Signal Corps equipment, when operated under severe climatic conditions, such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials. Some of the problems encountered are presented below.

(1) Resistors, capacitors, coils, chokes, transformer windings, etc., fail because of the effects of fungus growth and excessive moisture.

(2) Electrolytic action, often visible in the form of corrosion, occurs in resistors, coils, chokes, transformer windings, etc.; this causes eventual breakdown.

(3) Breakdown of insulation on hook-up wires and cables can cause arcing and eventual part failure. Fungus growth accelerates deterioration.

(4) Moisture forms electrical leakage paths on terminal boards and insulating strips, resulting in flashovers.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and excessive moisture. This treatment is explained in TB SIG 13, Moistureproofing and Fungiproofing Signal Corps Equipment, and TB SIG 72, Tropical Maintenance of Ground Signal Equipment.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66, Winter Maintenance of Signal Equipment, and TB SIG 219, Operation of Signal Equipment at Low Temperature.

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

e. Lubrication. No lubrication is required for Vibrator Pack PP–68B/U.

26. Rustproofing and Painting

a. When the finish on the case has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces. Use #00 or #000 sandpaper to clean the surface down to the bare metal. Obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with cleaning solvent. In severe cases, it may be necessary to use cleaning solvent to soften the rust, and sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations. Refer to TM 9–2851, Painting Instruction for Field Use, for painting instructions.

Section III. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

27. General

a. The trouble shooting and repair work that can be performed at the organizational maintenance level often is limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, trouble shooting is based on the performance of the equipment and the use of the senses in determining such troubles as worn vibrators, cracked sockets, etc.

b. Paragraphs 28 through 30 help in determining which circuit of the vibrator pack is at fault and in localizing the fault in that circuit to the defective component.

c. Complete trouble localization procedures and necessary repairs are discussed in chapter 5.

28. Inspection

a. Failure of the vibrator pack to operate properly usually is caused by one or more of the following faults:

(1) Improper switch settings.
(2) Improperly connected cables.
(3) Worn, broken, or disconnected cords or plugs.
(4) Burned out fuse (usually indicates another fault or incorrect operation of the vibrator pack).
(5) Broken wires.
(6) Defective vibrator.

b. When failure is encountered and the cause is not immediately apparent, check as many of the items given in subparagraph *a*(1) through (6) above as practicable, before starting a detailed examination of the component parts of the vibrator pack.

c. It is helpful to have a record of normal performance data of the equipment when looking for the source of trouble. If such a record is not available, try to obtain information from the operator of the equipment regarding performance at the time of failure.

29. Trouble Shooting by Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 30), indicates the correct sequence of steps to be taken for operation of the vibrator pack. The checklist gives the item to be checked, the normal indications, and the corrective measures that can be taken. *When using this chart, perform the items in numerical sequence.*

b. Action or Condition. The information in this column indicates the components to be checked and the settings of various switches and controls.

c. Normal Indications. The normal indications listed include the visible and audible signs that the operator should perceive when checking the item. If the indications are not normal, the operator should apply the recommended corrective measures

d. Corrective Measures. The corrective measures listed are those that the operator can make without turning in the equipment for repairs. If the vibrator pack is completely inoperative, or if the recommended corrective measures do not yield results, more extensive trouble shooting is necessary (see Ch. 5).

30. Equipment Performance Checklist

	Item No.	*Item*	*Action or condition*	*Normal indication*	*Corrective measures*
PREPARATORY	1	Cable.	Connect input cable properly to battery.		
	2	Equipment to be powered.	Connect input plug to POWER OUT receptacle of vibrator pack.		
START	3	INPUT VOLTAGE switch.	Set to proper battery voltage (6V or 12V).		
	4	FUSE.	Insert proper fuse in fuse-holder for desired input voltage. 6V-20 amp (for 6V) 12V-10 amp (for 12V)		

30. Equipment Performance Checklist (contd)

	Item No.	*Item*	*Action or condition*	*Normal indications*	*Corrective measures*
START	5	OUTPUT POWER switch.	Set to proper power rating (15W or 50W) depending on wattage of equipment to be powered.		
	6	Equipment to be powered.	Set on-off switch on this equipment to ON.		
	7	POWER switch (on vibrator pack).	Set to ON.	Operation of vibrator will be heard.	Check fuse. Replace worn vibrator. Check for defective POWER switch. Check for defective INPUT VOLTAGE switch. Check for poor battery connections.
STOP	8	POWER switch (on vibrator pack).	Set to OFF.	Vibrator stops.	Check for defective POWER switch. Refer to chapter 5.

CHAPTER 4

THEORY OF OPERATION

31. Basic Theory of Operation (fig. 10)

a. In Vibrator Pack PP–68B/U, the actuating coil in the vibrator and the primary of the transformer are in separate circuits. The actuating coil is in series with a single *driver* contact. When POWER switch S1 is closed, the actuating coil is energized and pulls the vibrating reed away from the driver contact. This opens the *driver* contact and breaks the circuit through the actuating coil. The reed then springs back, closes the *driver* contact, and again energizes the actuating coil. The electrical and physical dimensions of the components in the circuit (especially the physical dimensions and weight of the vibrating reed) are such that the reed repeats this cycle and vibrates at a rate of 60 cycles per second (cps).

b. When the reed is pulled in toward the actuating coil, the contacts that are connected to pin 6 of the vibrator are closed. This completes a dc circuit through the upper section of transformer T1 and a pulse of current flows during the interval that the contacts are closed. When the reed is released, it breaks this circuit and springs back to the opposite contacts that are connected to pin 1 of the vibrator. This completes a dc circuit through the lower section of T1 and a pulse of current flows during the interval that the contacts are closed. These paired contacts are commonly referred to as the *power* or *interrupter* contacts.

c. Regardless of the polarity at the clip leads, current flows through the primary of T1 first in one direction and then in the opposite direction as the vibrator closes the alternate pairs of *power* contacts. These alternating pulses produce an alternating output in the secondary of T1. Since the reed vibrates at approximately 60 cps, the output frequency is approximately 60 cps. The output voltage wave form is essentially square wave.

32. Input Circuits (fig. 10)

a. Actuating Coil. This circuit extends from the upper clip lead through S1, section C of S2, terminal 3 of socket X1, the actuating coil, the *driver* contact, the reed, and fuse F1 or F2, to the lower clip lead. The circuit is closed when POWER switch S1 is set at ON, and is interrupted 60 times per second by the making and breaking of the *driver* contact. When the vibrator pack is used with a 6-volt storage battery, INPUT VOLTAGE switch S2 is set at 6V and the entire input voltage is applied across the

actuating coil. When a 12-volt storage battery is used, S2 is set at 12V and R3 is inserted in the circuit in series with the actuating coil. R3 is a voltage dropping resistor which drops the voltage applied to the coil to approximately 6 volts.

b. Primary of Transformer T1. There are two branch circuits through the primary of T1; one through the upper half, the other through the lower half. One branch extends from the upper clip lead through S1, terminal 3 (the center tap) of T1, terminal 1 of T1 when INPUT VOLTAGE switch S2 is at 6V, or terminal 2 of T1 when S2 is at 12V, r–f choke coil L1, pin 6 of the vibrator and its paired *power* contacts, the reed, and fuse F1 or F2 to the lower clip lead. The other branch is similar except that it extends from terminal 3 of T1 to terminal 4 or 5 of T1, rf choke coil L2, pin 1 of the vibrator and its paired *power* contacts, and back through the reed and fuse F1 or F2 to the lower clip lead. Current flows alternately in the upper and lower sections of the transformer when the reed makes contact with the upper and lower *power* contacts of the vibrator. This occurs 60 times per second for each pair of contacts. For 12-volt operation, INPUT VOLTAGE switch S2 is set at 12V and current flows through the complete upper and lower halves of the transformer primary as each pair of *power* contacts is closed. For 6-volt operation, S2 is set at 6V and current flows through approximately half of each upper and lower half of the transformer primary. The step-up turns ratio for 6-volt operation is approximately twice that for 12-volt operation. Therefore, the output voltage at the secondary of T1 for both types of operation is almost the same (100 to 110 volts).

c. Input Circuit Filters.

(1) C4 filters out rf hash from across the input leads.

(2) C1 and C2 filter out rf hash from across each of the input leads and chassis ground. They also help to filter out rf hash from across the two input leads.

(3) C6A and C6B reduce r–f hash across the upper and lower pairs of vibrator *power* contacts.

(4) L1 keeps rf hash out of the upper half of the primary of T1; L2 keeps rf hash out of the lower half of the primary of T1.

(5) C3 and the parallel combination of R1 and R2 prevent arcing across the vibrator *driver* contact.

33. Output Circuit (fig. 10)

a. Circuit Theory. The 60-cps pulses applied to the primary of T1 produce a 60-cps, 100- to 110-volt ac voltage in the secondary. This circuit is switched by section D of INPUT VOLTAGE switch S2 to keep the output voltage constant for 6- and 12-volt operation and by OUTPUT POWER switch S3 to keep the output voltage constant for 50- and 15-watt loads. Buffer capacitor C9 is across the secondary of T1 to limit the sharp

peaks that otherwise would be produced when the *power* contacts open. This prevents arcing and a resulting pitting of the *power* contacts. C8 and C10 prevent rf hash from being applied across the terminals of POWER OUT receptacle J1. The junction of these two capacitors is connected to chassis ground to prevent rf potentials from being set up between either output lead and chassis.

b. Switching Arrangement. If the entire output of the secondary of T1 were applied to both 50- and 15-watt loads, the output voltage applied to the 15-watt load would be higher than that applied to the 50-watt load because of the lower current drain and lower voltage drop in T1 during 15-watt operation. To compensate for this, the secondary of T1 is tapped down for 15-watt operation through OUTPUT POWER switch S3. Also, the transformer efficiency for 6-volt operation is greater than that for 12-volt operation. To compensate for this, the transformer secondary is tapped down for 6-volt operation. The combined switching of section D of INPUT VOTAGE switch S2 and the two sections of OUTPUT POWER switch S3, selects the desired taps in the secondary of T1. For 12-volt, 50-watt operation, the full output from the secondary of T1 is taken from terminals 6 and 10. For 12-volt, 15-watt operation, the output is taken from terminals 6 and 9. For 6-volt, 50-watt operation, the output is taken from terminals 6 and 8. For 6-volt, 15-watt operation, the output is taken from terminals 6 and 7. The switching arrangement serves to keep the output voltage constant for different loads and switch settings.

CHAPTER 5

FIELD MAINTENANCE INSTRUCTIONS

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

Section I. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

Warning: When servicing Vibrator Pack PP–68B/U, be extremely careful of high voltages. Always disconnect the input power cable from the battery before making any repairs or resistance checks.

34. Trouble-shooting Procedures

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

b. Circuit Sectionalization and Localization. The tests listed below aid in isolating the source of trouble. To be effective, the procedure should be followed in the order given. First, trouble should be localized to a single circuit. Then the trouble may be isolated within that circuit by appropriate voltage, resistance, and continuity measurements. The service procedure is summarized as follows:

(1) *Inspection.* The purpose of inspection (par. 28) is to locate any visible trouble. Through this inspection alone, the repairman frequently may discover the trouble or determine the circuit in which the trouble exists. This inspection is valuable in avoiding additional damage to the power supply that could occur through improper servicing methods.

(2) *Resistance measurements.* These measurements (par. 40) may prevent further damage to the vibrator pack from possible short circuits caused by faulty components.

(3) *Voltage measurements.* These measurements (par. 40) may indicate defects that are difficult to detect by resistance measurements.

(4) *Operational test.* The operational test (par. 38) is important because it frequently indicates the general location of trouble. In many instances, the information gained determines the exact nature of the fault. In order to utilize this information fully, all symptoms must be interpreted in relation to one another.

(5) *Trouble-shooting chart.* The trouble symptoms listed in this chart (par. 39) aid greatly in localizing trouble.

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

35. Trouble-shooting Data

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

Fig. or Par. No.	*Description*
Fig. 1	Vibrator Pack PP–68B/U.
Fig. 5	Vibrator Pack PP–68B/U, bottom view of chassis.
Fig. 6	Vibrator Pack PP–68B/U, top view of chassis.
Fig. 7	Vibrator Pack PP–68B/U, vibrator removed.
Fig. 10	Vibrator Pack PP–68B/U, schematic diagram.
Par. 40	Voltage and resistance checks.

36. Test Equipment Required for Trouble-shooting

The test equipment required for trouble shooting Vibrator Pack PP–68B/U is listed below.

Test equipment	*Technical manual*
Multimeter TS–352/U or equal	TM 11–5527
220-ohm, 100-w resistor (50-w dummy load)	
734-ohm, 25-w resistor (15-w dummy load)	

37. General Precautions

Whenever the vibrator pack is serviced, observe the following warnings and precautions very carefully:

a. When the chassis assembly is removed from the case, points having dangerous voltages are exposed.

b. Careless replacement of parts often causes additional faults.

c. Before a part is unsoldered, note the position of the leads. If the part, such as a transformer, has a number of connections, tag each of its leads.

d. Be careful not to damage other leads; pull or push them out of the way.

e. Do not allow drops of solder to fall into the chassis. They may cause short circuits.

f. A carelessly soldered connection may create a new fault. It is very important to make well-soldered joints, because a poorly soldered joint is one of the most difficult faults to find.

38. Operational Test

Connect the vibrator pack to a load as in normal operation and operate the equipment as described in the equipment performance checklist (par. 30). Listen for cracking or buzzing noises, which may indicate high voltage arcing. Check the vibrator pack for smoke and odor of burned or overheated parts.

39. Trouble-shooting Chart

The following chart is supplied as an aid in locating trouble in the power pack. This chart lists the symptoms which the repairman perceives, either visually or audibly, while making a few simple tests. Once the trouble has been localized to a circuit, voltage and resistance measurements of this circuit should be sufficient to isolate the defective part. Normal voltage and resistance measurements are given in paragraph 40. Perform the checks in the order listed in the chart. When each check is performed it is assumed that all previous troubles have been corrected.

39. Trouble-shooting Chart (contd)

Symptoms	*Probable trouble*	*Correction*
1. Vibrator does not operate.	1. Poor battery contacts.	1. Clean battery clips and battery terminals.
	INPUT VOTAGE switch S2 set at 12V when 6-volt battery is used.	Throw INPUT VOLTAGE switch S2 to 6V position.
	Fuse burned out (see symptom 2).	Replace fuse.
	Vibrator not properly seated in socket.	Seat vibrator firmly in socket X1.
	Vibrator unit defective.	Replace vibrator unit.
	Resistor R3 open (12V position).	Replace resistor R3.
	Capacitor C3 shorted.	Replace capacitor C3.
2. Fuse is burned out.	2. Input voltage switch S2 set at 6V when 12-volt battery is used.	2. Set INPUT VOLTAGE switch S2 to 12V position.
	Vibrator E1 defective.	Replace vibrator E1.
	Capacitor C4, C5, C6A, C6B, or C9 shorted.	Replace shorted capacitor.
	Defective load circuit.	Check load for proper wattage rating.

39. Trouble-shooting Chart (contd)

Symptoms	*Probable trouble*	*Correction*
3. Output voltage low (less than 100 volts ac).	3. OUTPUT POWER switch S3 set for 15W when load is more than 15 watts.	3. Throw OUTPUT POWER switch S3 to 50W position. (POWER switch should be at OFF whenever setting of OUTPUT POWER switch is changed.)
	Battery not fully charged.	Charge or replace battery.
	Vibrator E1 worn.	Replace vibrator E1.
	INPUT VOLTAGE switch S2 set at 12V when 6-volt battery is used.	Set INPUT VOLTAGE switch S2 to 6V position.
	Coil L1 or L2 or connection is open.	Replace L1 or L2, or repair connection.
4. Output voltage high (above 130 volts ac).	4. OUTPUT POWER switch S3 set at 50W when load is less than 50 watts.	4. Throw OUTPUT POWER switch S3 to 15W position.
5. Vibrator hum is heard but output voltage is zero.	5. Switch S2 or S3 or connection to S2 or S3 defective.	5. Repair switch connections or replace switch.
	POWER OUT receptacle J1 or connections defective.	Repair connections or replace POWER OUT receptacle J1.
	OUTPUT POWER switch S3 or connections defective.	Repair connections or replace OUTPUT POWER switch S3.
	Primary or secondary of transformer T1 open.	Replace T1.

40. Voltage and Resistance Checks

a. Voltage Checks. Connect the Vibrator Pack PP–68B/U to a 6-volt storage battery by securing the battery clips to the battery terminals. Disconnect the test equipment AC input plug from the vibrator pack POWER OUT receptacle J1. Throw INPUT VOLTAGE switch S2 to the 6V position, OUTPUT POWER switch S3 to the 50W position, and POWER switch S1 to ON. Refer to the lettered test points on figure 10. The following point-to-point ac voltages should be measured with an ac voltmeter.

Points of measurement	*Volts ac*
E to F	164
E to L	0
G to H	11.8
G to J	5.9
H to J	5.9
J to L	6.2

Note. The above readings are approximate and vary slightly with the condition of the storage battery used. When a copper oxide rectifier type ac voltmeter is used, the readings will be approximately 4% higher than those in the chart. The above test is under a condition of no load. *No load operation of the unit is not recommended for extended periods of time.*

b. Resistance Checks. Throw POWER switch S1 to OFF. Disconnect the battery clips from the storage battery. Keep the INPUT VOLTAGE switch at 6V and the OUTPUT POWER switch at 50W. Use a low resistance ohmmeter. Refer to the lettered test points on figure 10. The following approximate point-to-point readings should be obtained:

Points of measurement	*Resistance (ohms)*
E to F	8
E to L	Infinity
G to H	.1
G to J	Less than .1
H to J	Less than .1
J to K	4
J to L	4

Section II. REPAIRS

41. Replacement of Parts

When replacing parts in Vibrator Pack PP–68B/U, observe the directions given below:

a. Tagging Leads. Tagging leads is essential to insure correct rewiring when a part is replaced. Before unsoldering any leads, tie together the leads that are attached to each part. Use small tags or short pieces of adhesive tape to identify all wires in accordance with their numbered connections. Identify every lead that is to be removed.

b. Parts and Substitutions. When damaged parts must be replaced, use identical parts. If identical parts are not available and the damaged component is beyond repair, a substitution must be made. The part substituted must have identical electrical properties and must be of equal or higher voltage and current rating.

c. Location. Relocation of substituted parts may cause vibrator hash and is not recommended. Mount the new or replaced part in the same location as that formerly occupied by the damaged part. Fasten all mountings securely (figs. 5, 6, and 7).

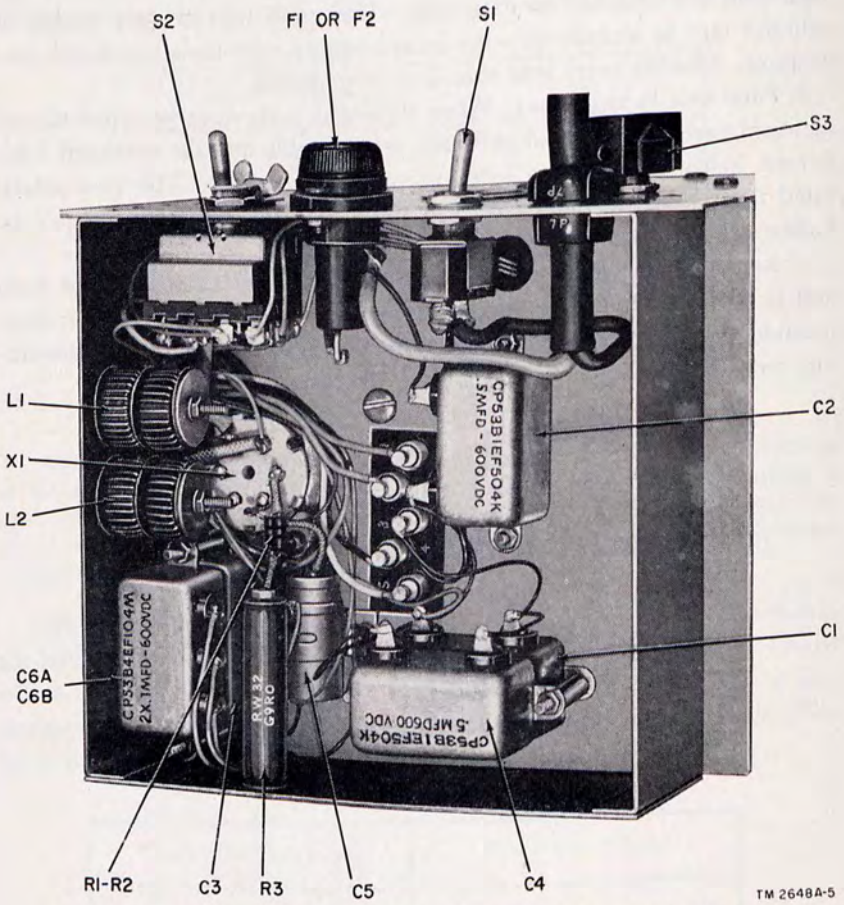


Figure 5. Vibrator Pack PP–68B/U, bottom view of chassis.

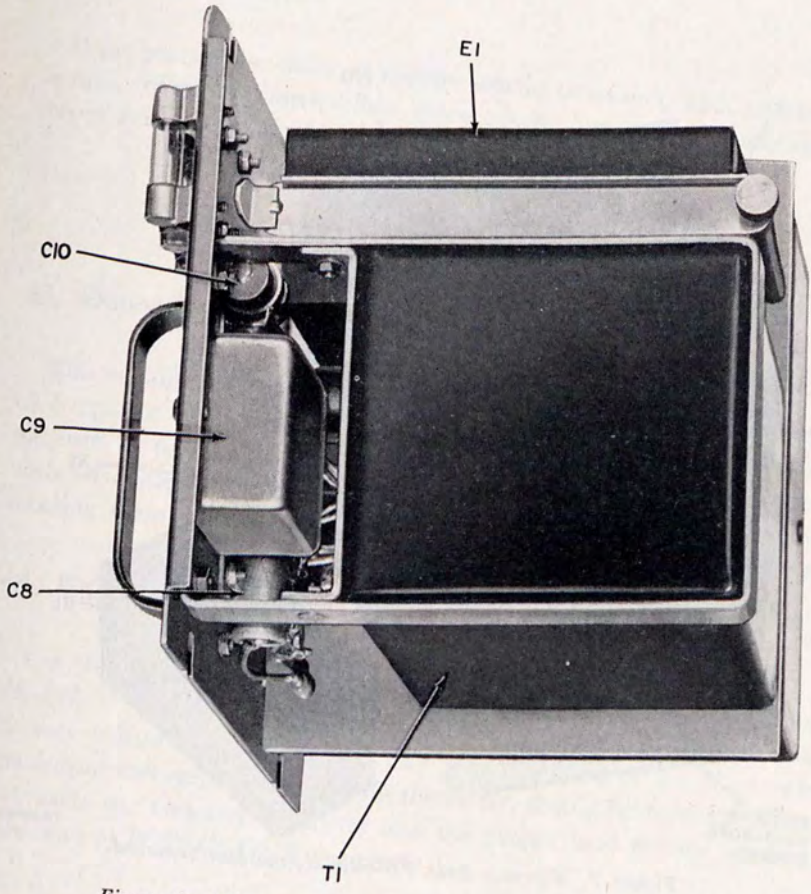


Figure 6. Vibrator Pack PP–68B/U, top view of chassis. TM 2648A-6

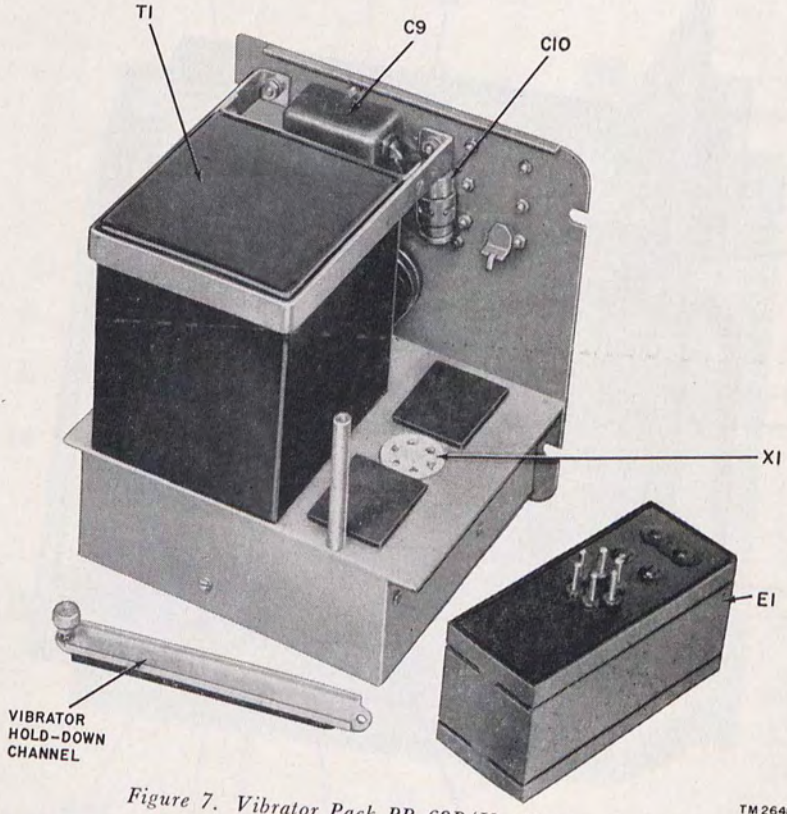


Figure 7. Vibrator Pack PP–68B/U, vibrator removed.

e. Soldering. Before soldering any connections, carefully scrape all parts that will be touched by the solder, until all traces of rust, corrosion, paint, or varnish are removed. Remove the scraped particles with a small, clean brush. Tin all surfaces to be soldered. Wrap the wire around the lug to obtain mechanical support. Use a small amount of solder to make the connection and use sufficient heat to make the solder flow evenly around the tinned surfaces.

42. Retropicalization

If the parts to be replaced require special treatment, such as retropicalization, follow the instructions given in the appropriate publication referred to in paragraph 25.

Section III. FINAL TESTING

43. General

This section is intended as a guide to be used in determining the quality of a repaired Vibrator Pack PP–68B/U. The minimum test requirements outlined in paragraph 44 may be performed by maintenance personnel with adequate test equipment and necessary skills. Repaired equipment meeting these requirements will furnish uniformly satisfactory operation.

44. Final Testing

Use the following equipment when performing final tests: Multimeter TS–352/U (or equal); a 220-ohm, 100-watt resistor; and a 734-ohm, 25-watt resistor. For each of the four tests described in the chart below, the output voltage, as measured on the meter, should be between 100 and 110 volts ac. Connect the meter and the proper load resistor across the terminals of POWER OUT receptacle J1.

Battery voltage	*INPUT VOLTAGE switch setting*	*OUTPUT POWER switch setting*	*Load resistor (ohms)*
6.3	6V	50W	220
6.3	6V	15W	734
12.6	12V	50W	220
12.6	12V	15W	734

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

45. Disassembly

The following instructions are recommended as a guide for preparing the vibrator pack for transportation and storage:

a. Disconnect the input power cord from the batteries, and fold and place it in the input power cable compartment.

b. Return Vibrator Pack PP–68B/U to the case in which it was shipped.

46. Repacking for Shipment or Limited Storage

a. Whenever practical, place a dehydrating agent such as silica-gel inside the power supply case.

b. Check the spare vibrator clamp to see that it holds the spare vibrator in place.

c. Tighten the four screws securing the chassis front panel to the case.

d. Replace the waterproof cover.

e. Protect the vibrator pack case with a waterproof barrier. Seal the seams of the paper barrier with waterproofing sealing compound or tape. Pack the protected case in a padded wooden case. Provide at least 3 inches of excelsior padding or other similar material between the paper barrier and the packing case.

f. Additional packing is required for oversea shipment; refer to U.S. Army specification No. 100–14A for specific export packing instructions.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

47. General

The demolition procedures outlined in paragraph 48 will be used to prevent the enemy from using or salvaging the vibrator pack or any of its useful parts. Demolition of the equipment will be accomplished only on order of the commander.

48. Methods of Destruction

a. Smash. Smash capacitors, transformer, resistors, sockets, plugs, and vibrators; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut all cords and wiring; use axes, handaxes, or machetes.

c. Burn. Burn instruction books, cords, and wiring; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend the panels and case.

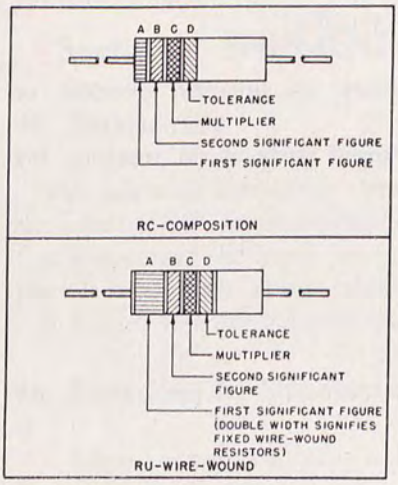
e. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

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

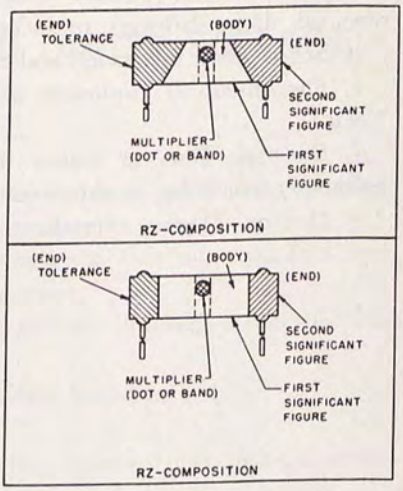
g. Destroy. Destroy everything.

RESISTOR COLOR CODE MARKING
(MIL-STD RESISTORS)

AXIAL-LEAD RESISTORS
(INSULATED)



RADIAL-LEAD RESISTORS
(UNINSULATED)



RESISTOR COLOR CODE

BAND A OR BODY*		BAND B OR END*		BAND C OR DOT OR BAND*		BAND D OR END*	
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)
BLACK	0	BLACK	0	BLACK	1	BODY	± 20
BROWN	1	BROWN	1	BROWN	10	SILVER	± 10
RED	2	RED	2	RED	100	GOLD	± 5
ORANGE	3	ORANGE	3	ORANGE	1,000		
YELLOW	4	YELLOW	4	YELLOW	10,000		
GREEN	5	GREEN	5	GREEN	100,000		
BLUE	6	BLUE	6	BLUE	1,000,000		
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7				
GRAY	8	GRAY	8	GOLD	0.1		
WHITE	9	WHITE	9	SILVER	0.01		

*FOR WIRE-WOUND-TYPE RESISTORS, BAND A SHALL BE DOUBLE-WIDTH. WHEN BODY COLOR IS THE SAME AS THE DOT (OR BAND) OR END COLOR, THE COLORS ARE DIFFERENTIATED BY SHADE, GLOSS, OR OTHER MEANS.

EXAMPLES (BAND MARKING):
10 OHMS ±20 PERCENT: BROWN BAND A; BLACK BAND B; BLACK BAND C; NO BAND D.
4.7 OHMS ±5 PERCENT: YELLOW BAND A; PURPLE BAND B; GOLD BAND C; GOLD BAND D.

EXAMPLES (BODY MARKING):
10 OHMS ±20 PERCENT: BROWN BODY; BLACK END; BLACK DOT OR BAND; BODY COLOR ON TOLERANCE END.
3,000 OHMS ±10 PERCENT: ORANGE BODY; BLACK END; RED DOT OR BAND; SILVER END.

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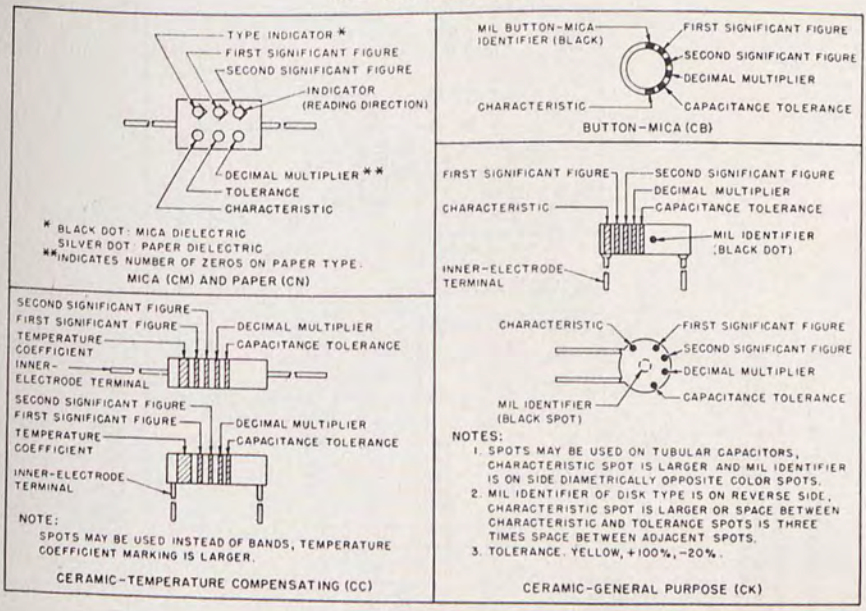
Figure 8. Resistor color codes.

CAPACITOR COLOR CODE MARKING
(MIL-STD CAPACITORS)



CAPACITOR COLOR CODE

COLOR	SIG FIG.	MULTIPLIER		CHARACTERISTIC[1]				TOLERANCE[2]					TEMPERATURE COEFFICIENT (UUF/UF/°C)
		DECIMAL	NUMBER OF ZEROS	CM	CN	CB	CK	CM	CN	CB	CC		
											OVER 10UUF	10UUF OR LESS	CC
BLACK	0	1	NONE		A			20	20	20	20	2	ZERO
BROWN	1	10	1	B	E	B	W				1		-30
RED	2	100	2	C	H		X	2		2	2		-80
ORANGE	3	1,000	3	D	J	D			30				-150
YELLOW	4	10,000	4	E	P								-220
GREEN	5		5	F	R						5	0.5	-330
BLUE	6		6		S								-470
PURPLE (VIOLET)	7		7		T	W							-750
GRAY	8		8			X						0.25	+30
WHITE	9		9								10	1	-330(±500)[3]
GOLD		0.1						5		5			+100
SILVER		0.01						10	10	10			

1. LETTERS ARE IN TYPE DESIGNATIONS GIVEN IN MIL-C SPECIFICATIONS.
2. IN PERCENT, EXCEPT IN UUF FOR CC-TYPE CAPACITORS OF 10 UUF OR LESS.
3. INTENDED FOR USE IN CIRCUITS NOT REQUIRING COMPENSATION.

STD-C1

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Figure 9. Capacitor color codes.

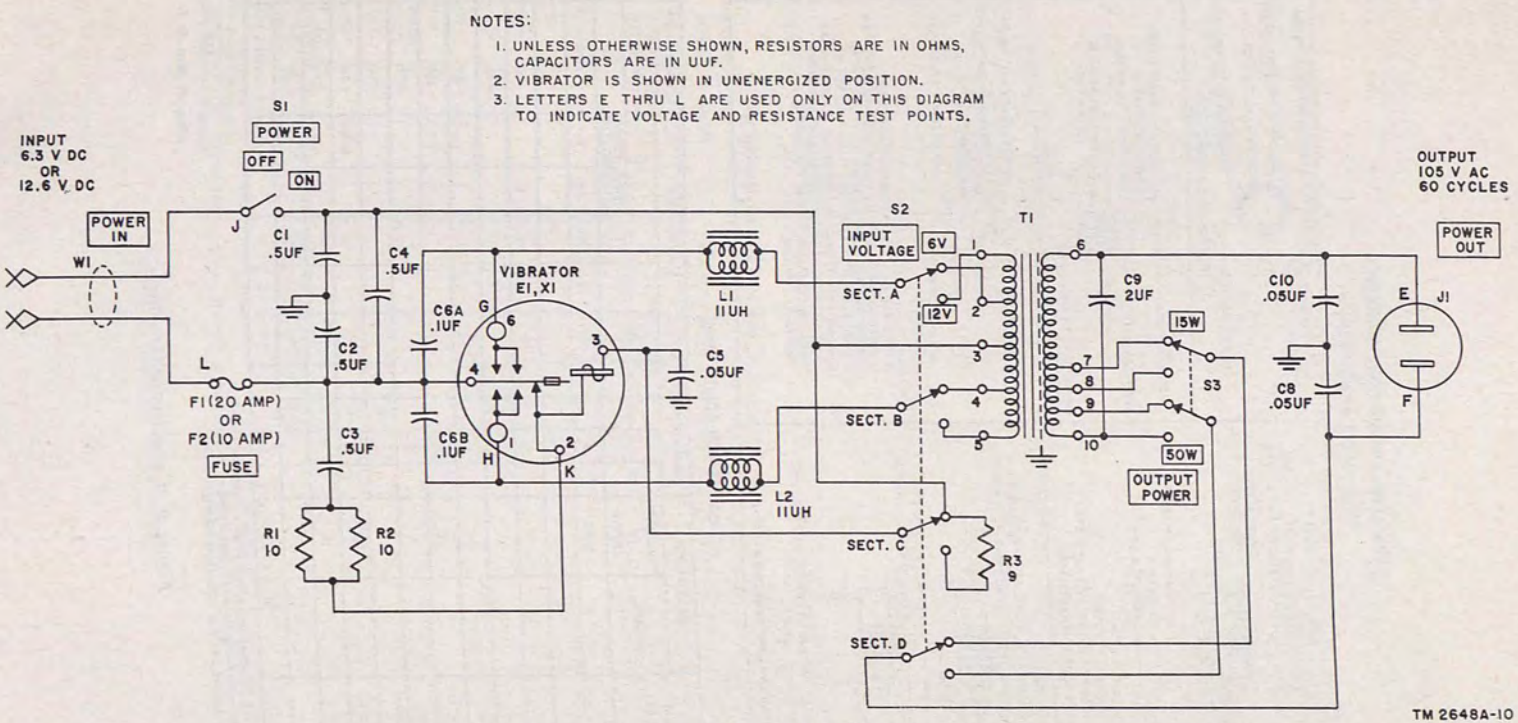

Figure 10. Vibrator Pack PP–68B/U, schematic diagram.