TM 11-415

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DRY BATTERIES

DEPARTMENT OF THE ARMY *FEBRUARY 1948*

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This manual supersedes TB 11-430-1, 21 September 1944, and chapter 2 of TM 11-430, 16 January 1942

DRY BATTERIES

DEPARTMENT OF THE ARMY • *FEBRUARY 1948*

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TM 11–415, Dry Batteries, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF THE ARMY:

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For explanation of distribution formula, see TM 38–405.

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DESTRUCTION NOTICE

Why—To prevent the enemy from using or salvaging this equipment.

When—When ordered by your commander.

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

2. Cut—Use axes, handaxes, machetes.

3. Burn—Use gasoline, kerosene, oil, flamethrowers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

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

Use Anything Immediately Available for Destruction of This Equipment

What—1. Smash—All batteries and terminals.

2. Cut—Leads and cables.

3. Burn—Technical manuals.

4. Bury or scatter—Everything.

Destroy Everything

This manual supersedes TB 11–430–1, 21 September 1944, and chapter 2 of TM 11–430, 16 January 1942.

SECTION I
DESCRIPTION

1. General

a. Dry batteries have a wide and varied application in military equipment; they are used to operate flashlights, telephone switchboards, photographic equipment, radiosondes, brakes, hearing aids, test instruments, radar equipment, radio receivers, radio transmitters, and numerous other devices. This wide variety of application imposes an extreme range of load conditions on the batteries used to power these equipments. For example, some equipments can use only a light-weight battery which must supply a moderate load for a single short operation; other equipments require a moderate-weight battery to supply a light load continuously; yet another equipment requires a moderate-weight battery to supply a very heavy load of short duration repeated frequently; other equipments use heavy batteries to supply very heavy single short loads after lengthy stand-by periods; still other equipments require light-weight batteries to supply moderate loads for long periods of time. Since any one battery of a given design has a limited range of useful application, dry-cell batteries of several different designs, types, and sizes (each with its own useful range of application) must be available to accommodate this extremely wide range of load conditions.

b. There are approximately 200 different dry-cell batteries available for use by the military services. This technical manual covers all batteries used by the Army; it describes all types (the LeClanche, Rubin-Mallory (RM),

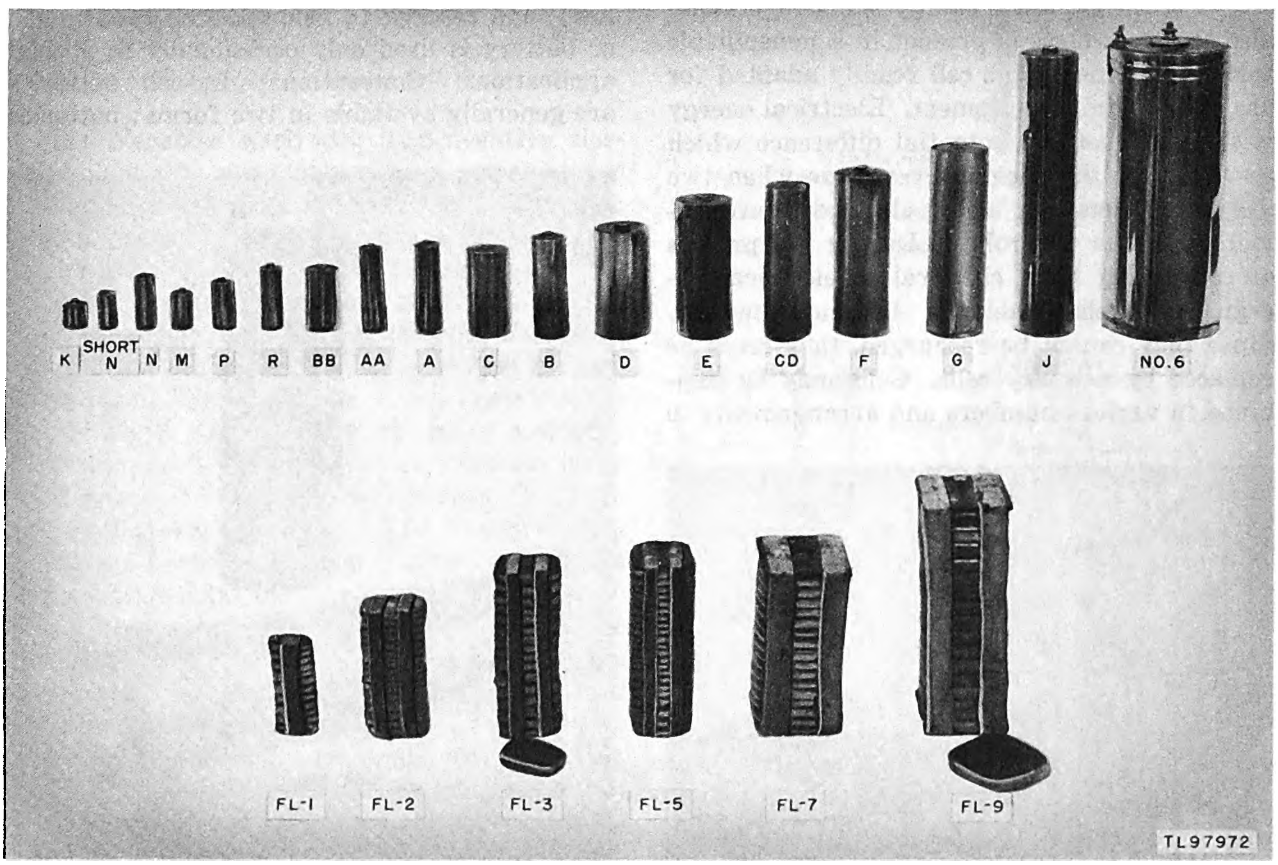

Figure 1. Typical LeClanche cells (reference symbols refer to standard cell sizes).

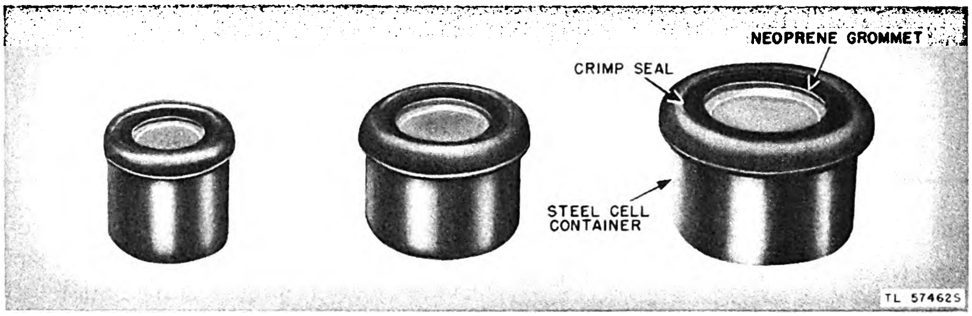

Figure 2. RM cells.

magnesium-silver-silver chloride, and zinc-silver chloride cell batteries) and their various forms and provides information regarding their characteristics, application, installation, maintenance, and storage in order to enable using personnel to make best possible use of batteries as a source of electrical power.

c. Dry-cell batteries are made from four basic types of dry primary cells: the LeClanche, RM, magnesium-silver-silver chloride, and zinc-silver chloride (figs. 1, 2, 3, and 4). In each of these types, the chemical action that is the source of the electrical energy is not reversible; also the electrolyte is present in a nonspillable form which makes the cell readily adapted for use with portable equipment. Electrical energy is the result of the potential difference which results from the chemical reactions when two dissimilar elements, called electrodes, are immersed in the electrolyte. During the process of converting from chemical to electrical energy, dry cells gradually become unusable. Since they cannot be recharged, they must be replaced by new dry cells. Cells may be combined in various numbers and arrangements to provide batteries that fill various voltage, current, and service requirements (par. 12).

2. LeClanche Dry Cells and Dry-Cell Batteries (figs. 5, 6, and 7)

a. General. LeClanche dry cells and dry-cell batteries, which are the most widely used type, use a system consisting of zinc, ammonium chloride, manganese dioxide, and carbon as their source of electrical energy. Cells and batteries of this type are of three kinds: conventional (*b* below), low-temperature (*c* below), and reserve (*d* below). The reserve cell or battery is used only occasionally in special applications. Conventional dry-cell batteries are generally available in two forms: batteries

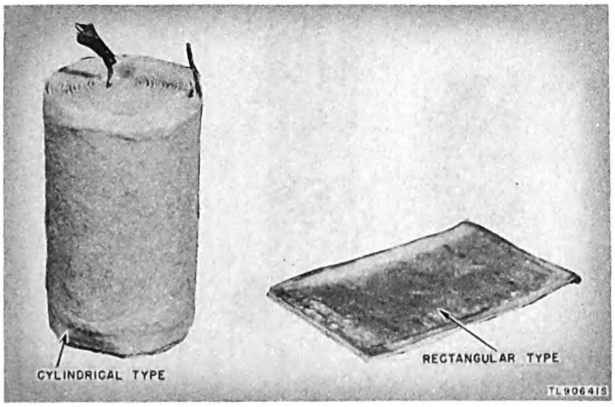

Figure 3. Magnesium-silver-silver chloride cells.

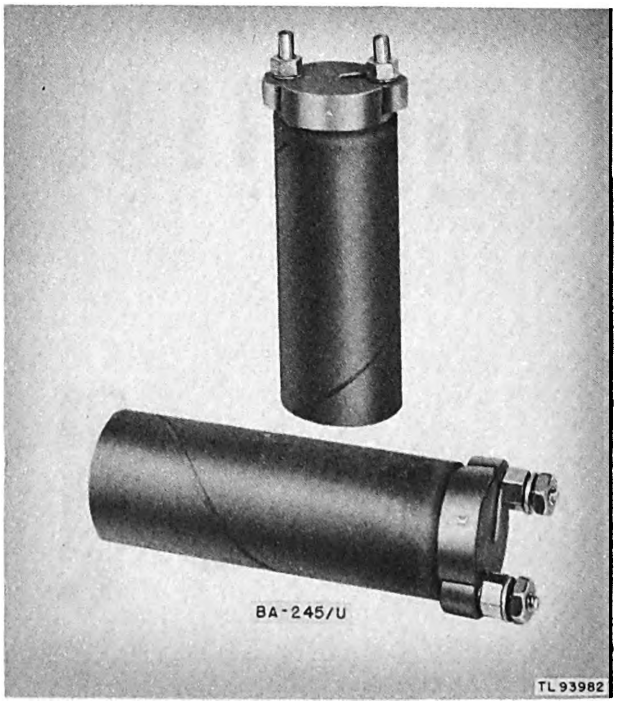

Figure 4. Zinc-silver chloride cells.

made from cylindrical dry cells (fig. 7) and batteries made from flat (or layer) dry cells (fig. 9).

b. CONVENTIONAL CELLS. (1) *Conventional cylindrical cells* (figs. 5 and 6). The conventional cylindrical dry cell consists of four major component parts: the zinc can or negative electrode, the bobbin or positive electrode, the paste or electrolyte, and the cell seal.

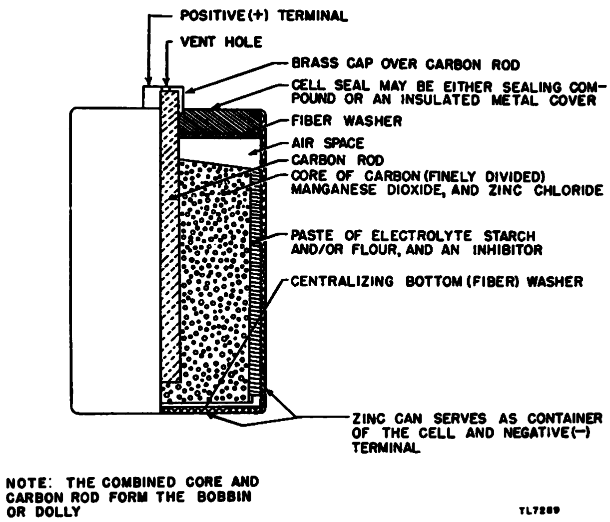

Figure 5. Cylindrical LeClanche cell, cross-section.

(*a*) *Negative electrode.* The negative electrode is a zinc can and acts as a container for the other components of the dry cell. This zinc can is generally provided with a binding post which serves as the negative terminal. The zinc can must be free from cracks to prevent the electrolyte from leaking out; the zinc must be of high purity, generally over 99.5 percent pure zinc. The impurities which make up the remainder are iron, copper, cadmium, and lead. The zinc can is usually 0.02 inch thick for large cells and 0.012 inch for smaller cells.

(*b*) *Positive electrode.* The positive electrode is a bobbin composed of a carbon rod and a pack of depolarizer mix (*1* and *2* below).

1. The carbon rod is the positive terminal of the cell and is composed of a mixture of coal tar pitch, finely divided petroleum coke, and graphite. The rods are heat-treated to form an electrically conductive electrode with a certain degree of porosity required for proper venting of gas which may be generated within the assembled cell (*e* below). The end of the carbon rod is generally provided with a brass cap to insure good electrical contact between cells or contact with equipment in which the batteries are to be used. The surface of the carbon rod is rough to assure good contact with the depolarizer mix.

2. The depolarizer mix is a homogeneous mixture of manganese dioxide and carbon black dampened with a solution of ammonium chloride or zinc chloride (or both) to a consistency which permits good packing. The mixture is approximately 90 parts by weight of manganese dioxide and 10 parts by weight of carbon black. The composition and physical properties of the mix exert the greatest single effect upon the behavior of the dry cell during its operation. The relative properties and consistencies of mixes used vary with each manufacturer and the probable use of the battery.

(*c*) *Electrolyte.* The electrolyte takes the form of a paste, the basic constituent of which is a concentrated solution of ammonium chloride. To this solution are added zinc chloride and such agents as chromic salt or mercuric chloride which are used to inhibit abnormal

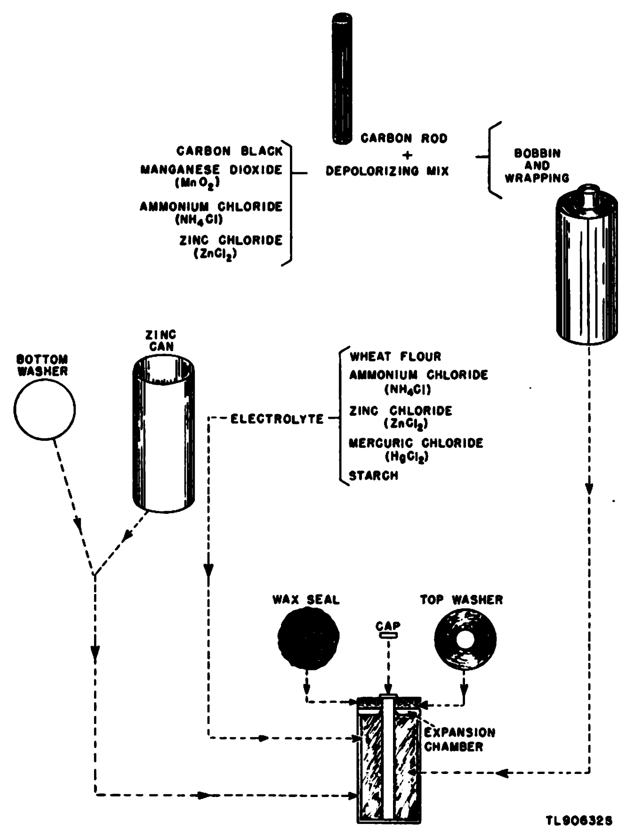

Figure 6. Cylindrical LeClanche cell, assembly and components.

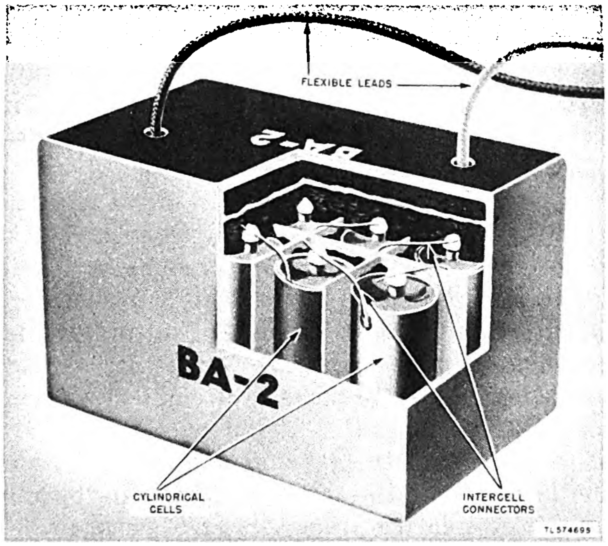

Figure 7. Assembly of a battery with cylindrical LeClanche cells.

zinc corrosion. Cornstarch or wheat flour (or both) is also added in sufficient quantity to form a stiff gelatinous immobile paste of high ionic conductivity (*e* below).

(*d*) *Cell seal.* The cell seal is a cell-closing device which protects the contents of the cell and prevents the loss of moisture by evaporation. The cell seal may be either a sealing-wax closure or an insulated metal closure.

1. The basic ingredient of most sealing waxes is rosin; powdered silicon and flake mica are added to increase the mechanical strength. Such coloring agents as carbon black and Venetian red may be added. Various types of pitches and asphalts are also used as sealing agents; however, since they are comparatively soft, they are used principally to seal multicell batteries.

2. An airtight seal to the cell is sometimes effected by a metal disk which is usually insulated from the zinc can and frequently from the carbon rod as well.

(*e*) *Assembly.* The four components discussed in *(a)* through *(d)* above converge in an assembly process to form the finished dry cell. The wetted depolarizer mix is packed into a cylindrical shape of desired size and a carbon rod is driven into the center of the mix to form what is known as the bobbin. A tight pack provides good contact within the depolarizer and between the depolarizer and the carbon rod. A paper washer is placed in the bottom of the zinc can and then a predetermined amount of electrolyte is placed into the can. The bobbin is then inserted and centered in the can; the bobbin is pushed in far enough to force the electrolyte solution between it and the zinc can to separate the two mechanically. The paste solution is immobilized by the starch which sets into a stiff gel. A paper washer, slipped over the top of the carbon rod, centers the bobbin within the zinc can. The cell seal is applied over the top washer and seals the cell. The cell is now ready for either assembly into a multiple cell battery or for individual cell use.

(2) *Conventional flat cells* (figs. 8 and 9). The conventional flat or layer cell consists of the same four major parts as the cylindrical cell, namely, the negative electrode, the positive electrode, the electrolyte, and the cell seal. The flat cell, however, generally has the shape of a thin rectangular prism (wafer).

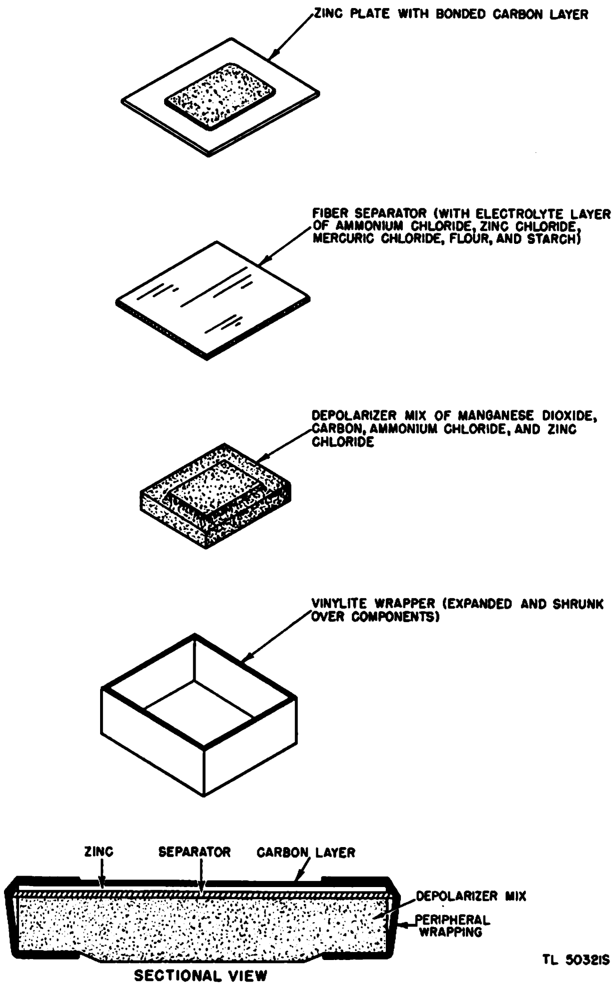

Figure 8. Flat LeClanche cell, sectional and exploded views.

(*a*) *Negative electrode.* The negative electrode is a rectangular sheet of high-quality zinc.

(*b*) *Positive electrode.* The positive electrode consists of a combination depolarizer mix block and carbon sheet.

(*c*) *Electrolyte.* The electrolyte is primarily ammonium chloride, held in place by means of a porous separator loaded with starch or flour (or both).

(*d*) *Cell seal.* Flat cells are usually sealed by means of a snug-fitting elastic plastic envelope; sometimes inclosure is accomplished with a sealing wax similar to that used with cylindrical dry cells.

(*e*) *Assembly.* Typical assembly of a flat cell is illustrated in figure 8.

c. LOW-TEMPERATURE CELLS. (1) Low-temperature cells are practically identical in general appearance to corresponding conventional cells; the principles of operation (*e* below) are the same for both low-temperature and conventional dry cells. At temperatures of 70° F. ± 10° F. the performance characteristics and service capacities of these cells are the same as for the conventional cells; at low temperatures, however, the performance of low-temperature cells is much better than that of the corresponding conventional cells (10*c* (2)). For example, at —20° F., Battery BA–2 would provide no service; on the other hand, Battery BA–2002/U (the low-temperature counterpart of BA–2) would provide 35 percent of its service at 70° F.

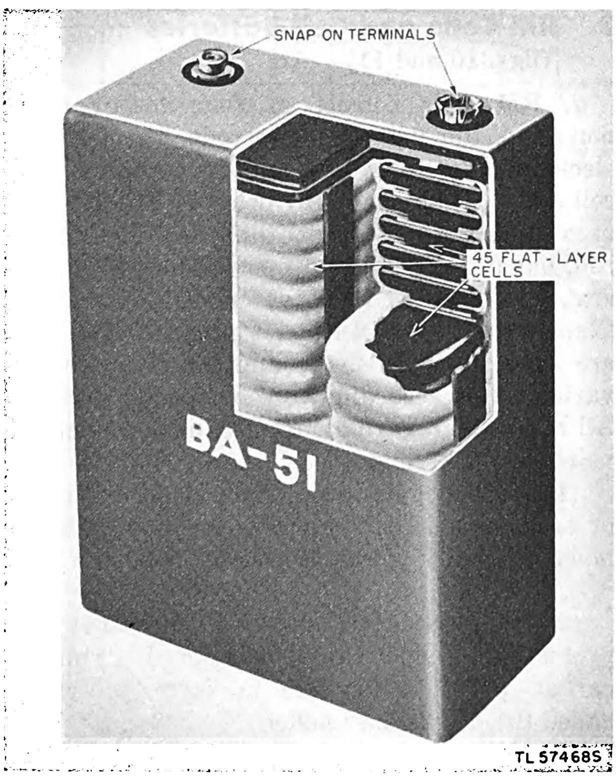

Figure 9. Assembly of a battery with flat LeClanche cells.

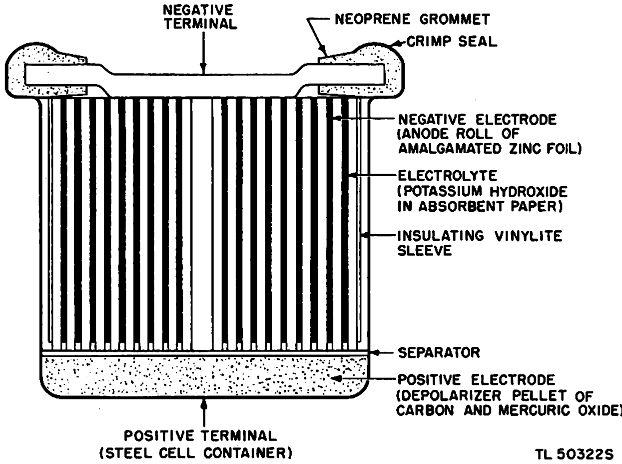

Figure 10. RM cell, sectional view.

(2) Unless stored at low temperatures (par. 16), low-temperature batteries deteriorate much more rapidly than conventional batteries. Low-temperature batteries must be stored at the lowest practical temperature available. When preparing these batteries for use, however, keep them dry and allow them to warm to normal temperatures (70° F. ± 10° F.) before placing them in service.

d. RESERVE CELLS. Reserve cells and cell batteries have the same major components as conventional cells and cell batteries, (*b* above) are made from the same materials, are assembled in the same manner, and have the same general appearance. The reserve cell differs from the conventional cell in that all its components are thoroughly desiccated (dried). Since no deterioration is possible in this desiccated state, the reserve cell has the advantage of unlimited shelf life. Before a reserve cell can be put into effective service, it must be activated, that is, filled or soaked with water for several hours, sometimes for a day. Reserve cells are not readily adapted to multicell batteries because of activation difficulties; they are generally used alone or in two-cell combinations. The

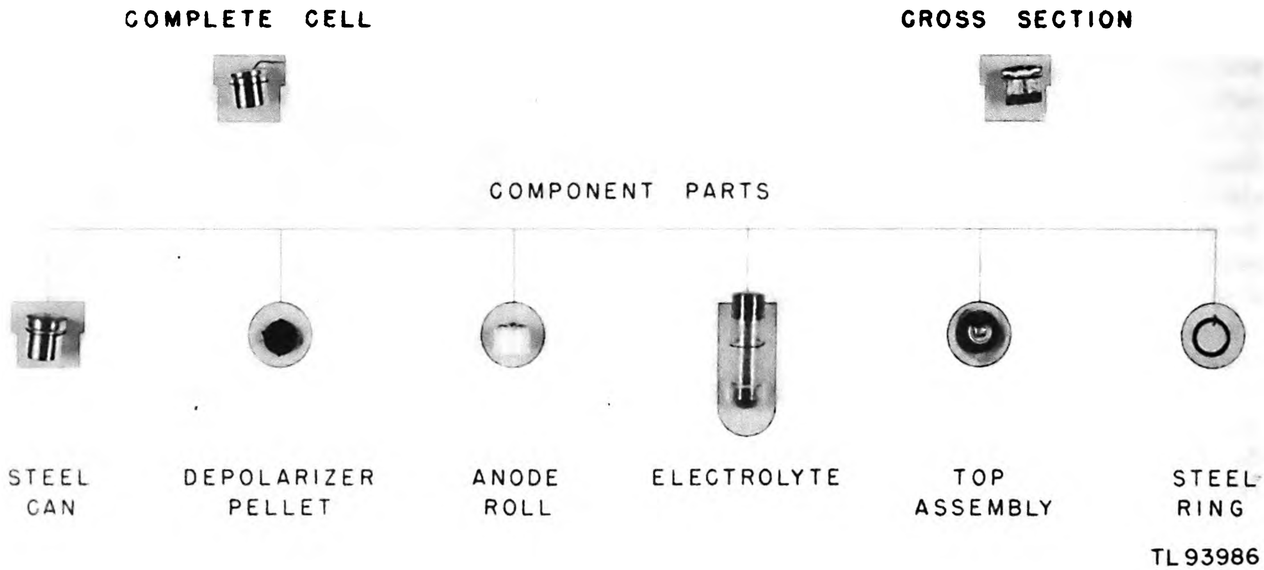

Figure 11. RM cell, assembly and components.

principles of operation of reserve cells are the same as those for conventional cells (*e* below).

e. Principles of Operation. A theoretical discussion of what happens in a cell or battery during the conversion of chemical to electrical energy is beyond the scope of this manual. The following discussion of what happens in a flashlight cell, a typical conventional cylindrical cell, is presented for illustrative purposes. The zinc container (negative electrode) is a vital element in the energy conversion. The carbon rod is the positive terminal of the cell. As a result of the chemical action between the zinc and the aqueous ammonium chloride (the electrolyte), the zinc goes into solution and enters the solution as zinc ions. These zinc ions are absorbed by the depolarizer mix. As a result of the formation of ions, electrons are liberated. The accumulation of electrons on the zinc electrode constitutes a negative charge. These electrons may travel through an external conducting circuit to the carbon rod and depolarizer mix, causing a flow of current in the external circuit. (Generally, the more zinc, depolarizer mix, and electrolyte present in the cell, the more electrical energy will be generated.) As the cell is used, the zinc gets thinner and the interaction between the zinc and the electrolyte chemicals produces reaction products. The accumulation of these reaction products tends to retard the action of the cell. Also, as the cell is used, the depolarizer mix becomes saturated with zinc ions; thus it becomes more difficult for the zinc ions to be absorbed in the electrolyte solution. As a result, the electrical output is gradually reduced until the cell is exhausted. This decrease is accompanied by a gradual drop in the working voltage of the cell.

3. RM Cells and Cell Batteries
(figs. 10 and 11)

a. RM cells consist of four major components: the negative electrode, the positive electrode, the electrolyte, and the container and cell seal ((1) through (5) below). The RM cell uses different materials than the LeClanche cell, but its principles of operation are, in general, the same as those described for the LeClanche cell (par. 2 *e*). At present, RM cells are cylindrical in shape and are available in various sizes according to the capacity desired. All RM cells, regardless of size, have a nominal voltage of 1.3 volts.

(1) The negative electrode is either a roll of amalgamated zinc strip or an amalgamated powdered-zinc pellet. In either case, the zinc is of high purity.

(2) The positive electrode is usually a pressed mercuric oxide, powdered graphitic carbon pellet, wafer-like in form, which is called the depolarizer pellet.

(3) The electrolyte is a solution of potassium hydroxide (KOH).

(4) The cell container is a cylindrical steel

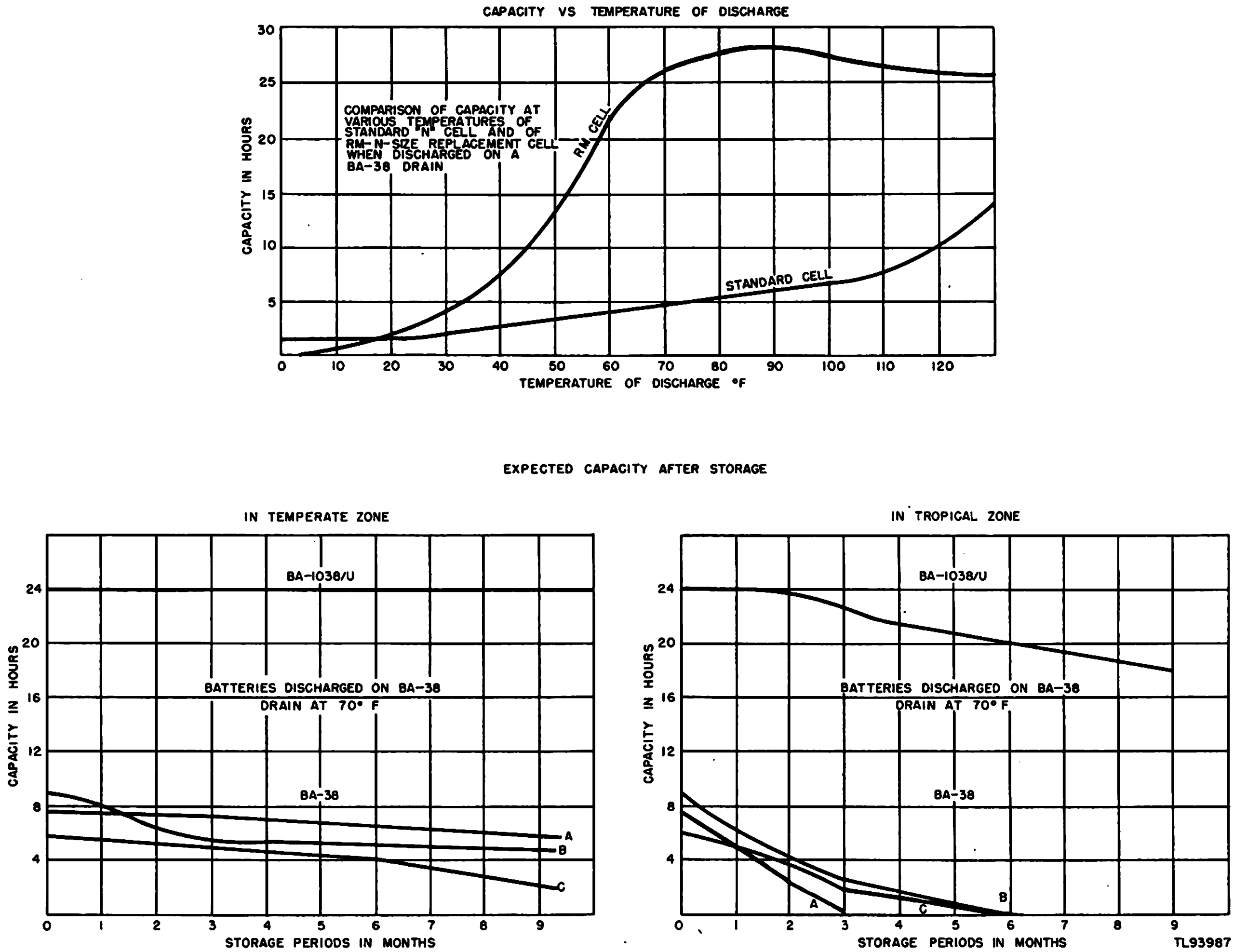

Figure 12. Comparative performance of RM Battery BA-1038/U and its conventional counterpart, Battery BA-38.

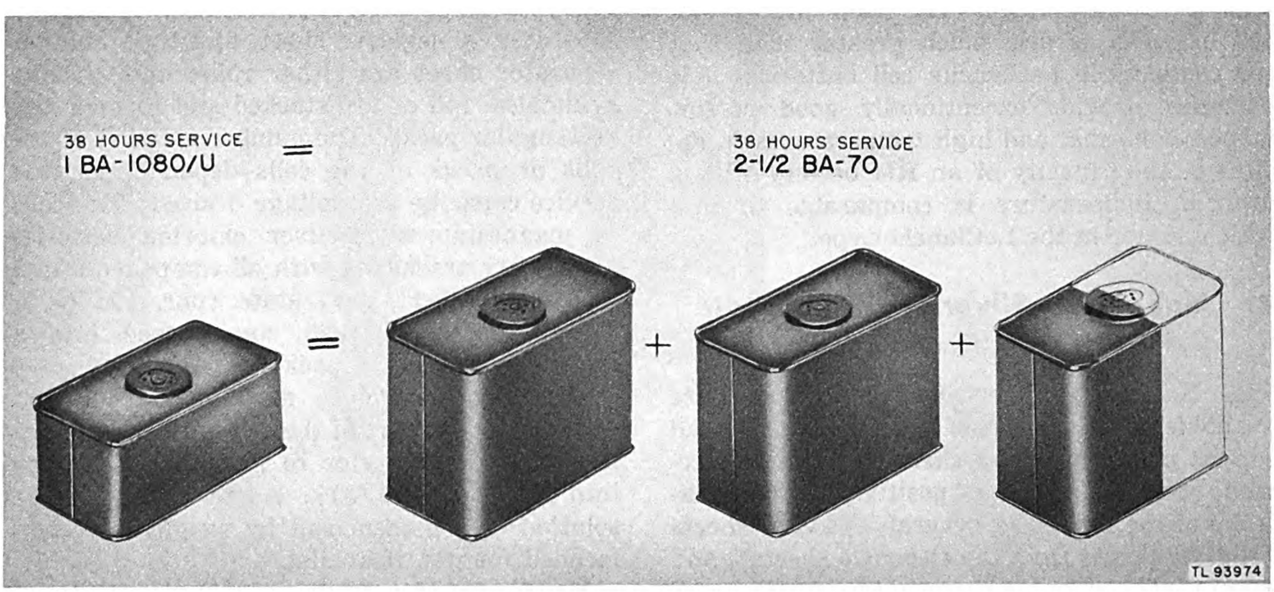

Figure 13. Comparative performance of RM Battery BA-1080/U and its conventional counterpart, Battery BA-70.

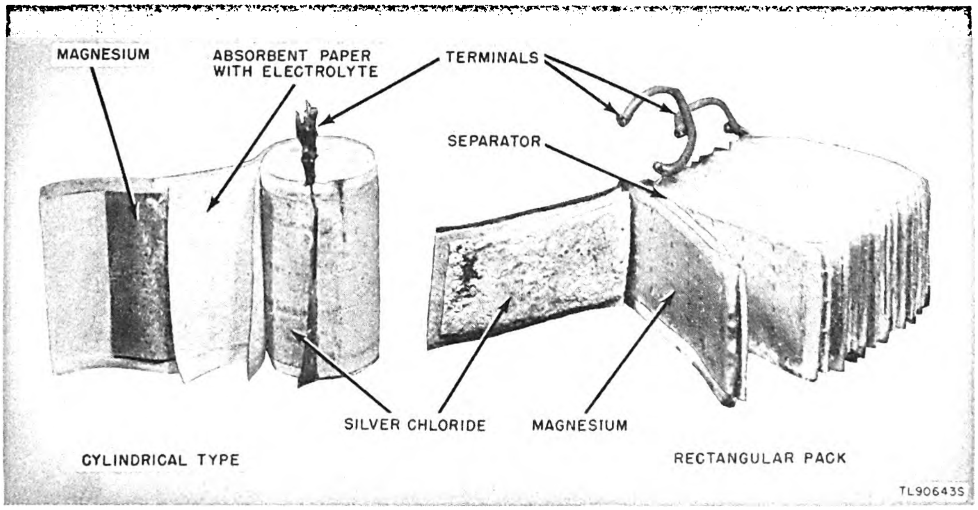

Figure 14. Magnesium-silver-silver chloride cells, assembly and components.

can which is provided with a top assembly and seal consisting of a neoprene grommet, a zinc or copper disk or plate, and a steel pressure ring. The edge of the steel can is crimped or turned to complete the closure and seal.

(5) Figure 11 illustrates how the various components of the cell are assembled.

b. The service capacity of the RM cell, on a per unit weight or per unit volume basis, is several times greater than that of the LeClanche cell (figs. 12 and 13). How much greater the service capacity will be is determined by the following factors: load, scheduled use, lowest tolerable operating voltage, and operating voltage. The shelf life of RM cell batteries is also much greater than that for comparable LeClanche cell batteries. RM batteries provide exceptionally good performance at normal and high temperatures; a decline in the capacity of an RM battery with a drop in temperature is comparable to that which occurs in the LeClanche type.

4. Magnesium-Silver-Silver Chloride Cell Batteries (fig. 14)

a. Magnesium-silver-silver chloride cells are available in a variety of forms, but they all consist principally of a sheet of negative electrode material, a sheet of positive electrode material of the same size, several separator sheets (slightly larger than the electrode sheets), and a cell container or binding structure. Each cell has a nominal voltage of 1.5 volts; its principles of operation, despite the different materials used, are the same as those described for the LeClanche cell (par. 2*e*).

(1) The negative electrode is a sheet of magnesium foil of high purity.

(2) The separators are porous, highly absorbent material, usually high quality drying or blotting paper.

(3) The positive electrode is a sheet of silver chloride, usually deposited or mounted on a silver grid or screen.

(4) The cell container or binding structure is usually a plastic which allows water to enter freely during activation.

(5) During assembly, a positive sheet, a separator, a negative sheet, and then another separator sheet are either rolled into a snug cylindrical roll or are stacked and formed into rectangular packs. The number and size of the rolls or packs of the cells depend upon the service capacity and voltage desired. The cells of magnesium-silver-silver chloride batteries are always assembled with all components in a desiccated (inert, dry) state (par. 10*c* (5)). The batteries, in turn, are packed into a moisture-vaporproof package.

(6) The electrolyte may be tap or salt water; it is not part of the cell until the battery is activated just prior to placing the battery into use (par. 11*a* (3)). A salt water (NaCl) solution of 4 percent salt by weight is recommended for use, if available.

b. These batteries are excellent sources of power, per unit weight or per unit volume,

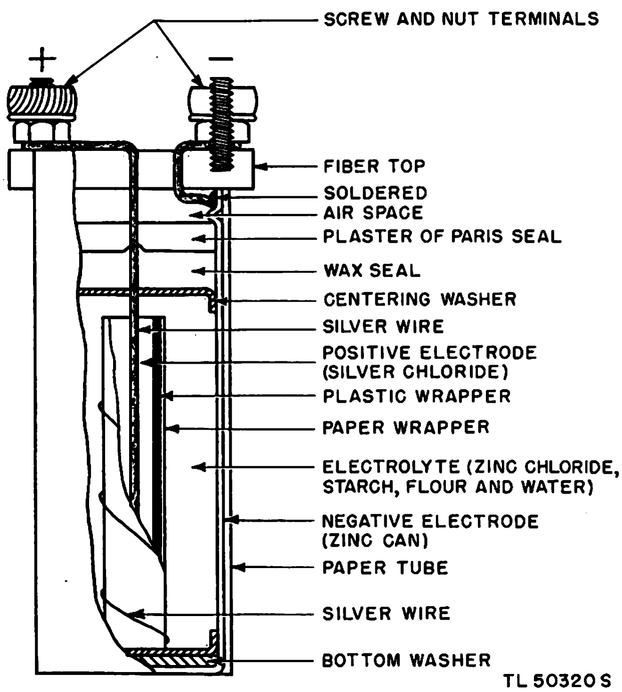

Figure 15. Zinc-silver chloride cell, sectional view.

when they are used under ideal conditions of heavy continuous loads for short periods of time. Once activated, these batteries must be used immediately if the available electrical energy is to be applied effectively (par. 11*a* (3) (*e*)). The discharge curve (voltage against time) for these batteries is very flat throughout a fair range of loads and ambient temperatures. Magnesium-silver-silver chloride cells are used in the following batteries:

Battery	*Voltage (when activated)*
BA–252/U	6
BA–253/U	6
BA–256/U	6
BA–257/U	115

5. Zinc-Silver Chloride Cell Batteries

a. The zinc-silver chloride cell is cylindrical in shape and has an open-circuit voltage of 1.0 volt. It consists of a negative electrode, a positive electrode, an electrolyte, and a cell seal. Its principles of operation are same as those described in paragraph 2*e* for the LeClanche cell.

(1) The negative electrode is high quality pure zinc in the form of a zinc can which contains the other components of the cell.

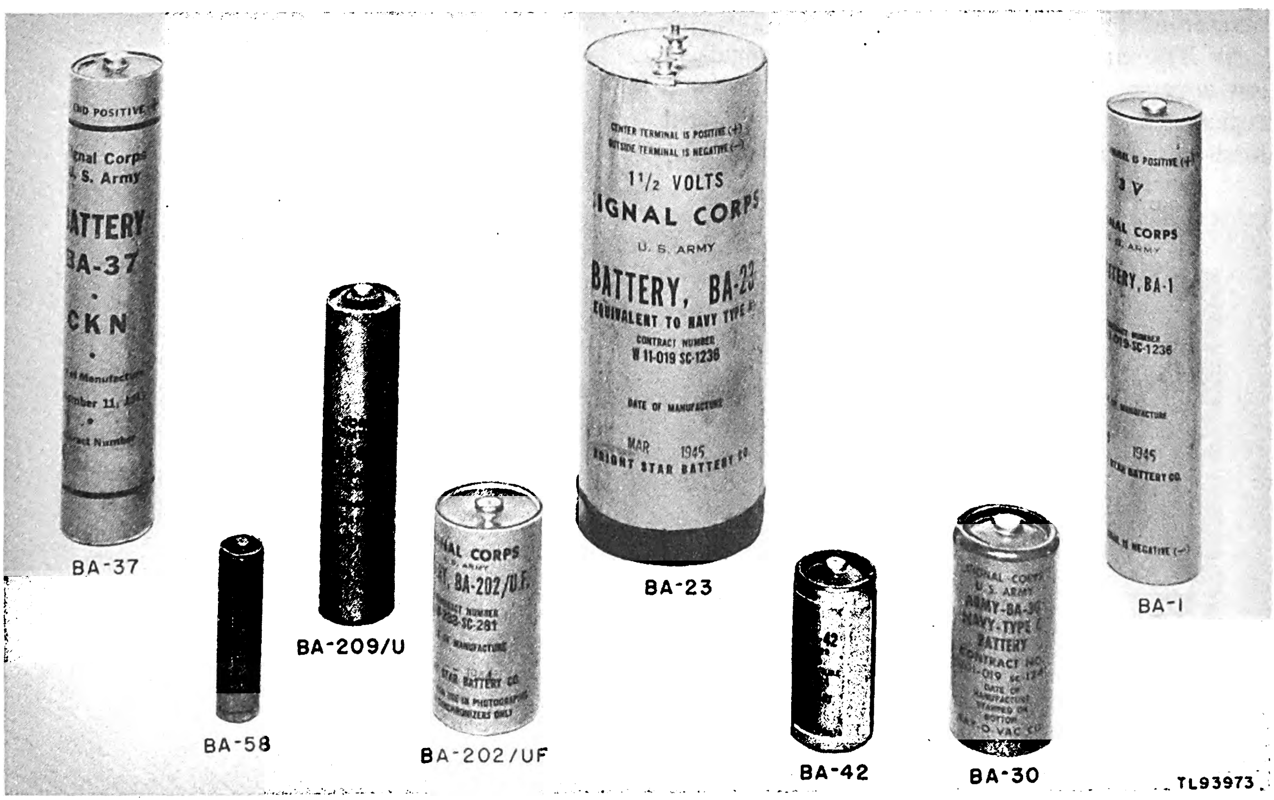

Figure 16. Flat surface terminals.

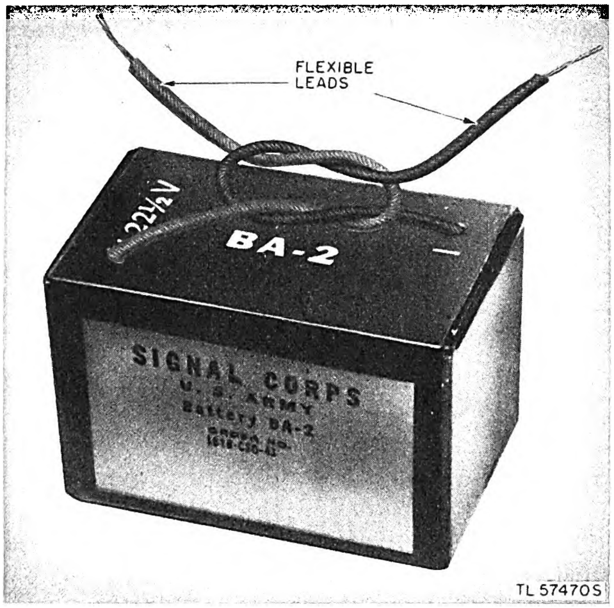

Figure 17. Flexible lead terminals.

Figure 18. Stud and nut terminals.

(2) The positive electrode is a silver chloride element.

(3) The electrolyte is ammonium chloride combined with starch and flour to form a paste.

(4) The cells are sealed at the top with plaster of Paris.

b. The zinc-silver chloride cell is generally a low-service capacity cell, has a high internal resistance, and is capable of only very light loading. It is ordinarily incapable of supply-

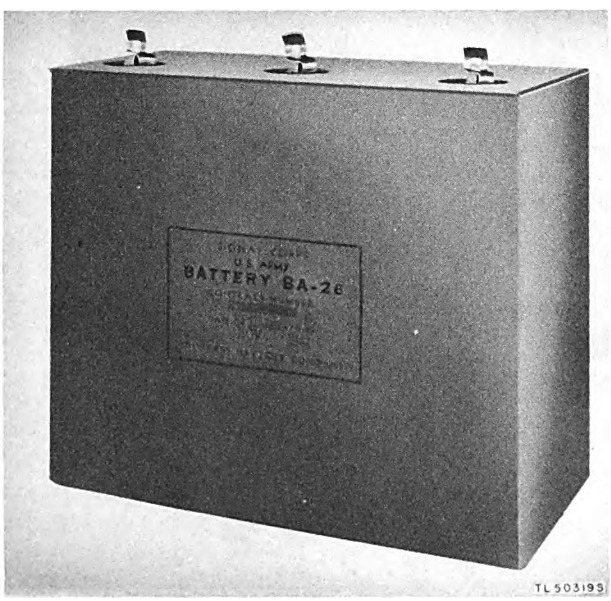

Figure 19. Spring clip terminals.

Figure 20. Cable connector terminals.

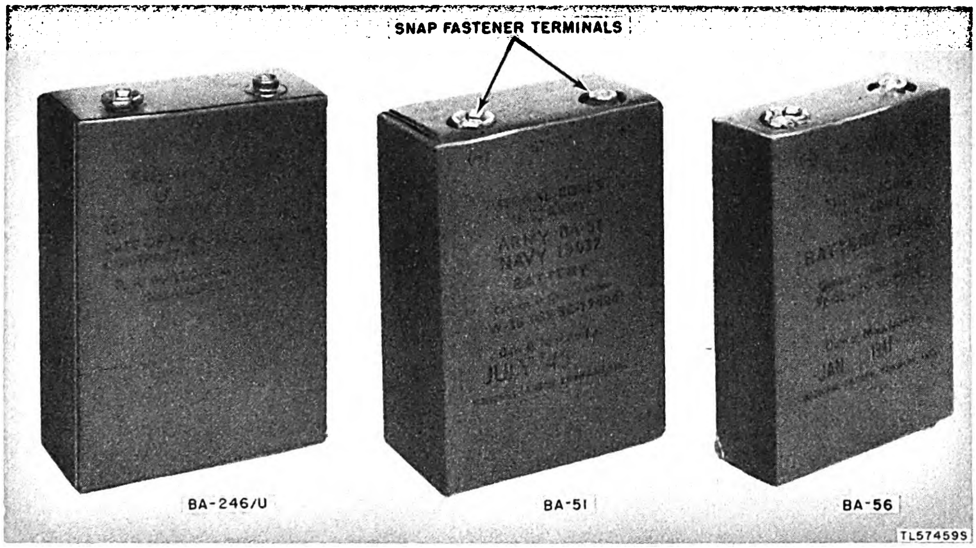

Figure 21. Snap fastener terminals.

ing loads in excess of 10 milliamperes (ma). Battery BA-245/U (fig. 4) is the only battery of this type in use at the present time; it is used with the blasting galvanometer where it is desired that a test load should not exceed a very low value. The shelf life of the zinc-silver chloride cell at temperatures above 70° F. is short; at temperatures of 70° F. or lower, it can be stored for a considerable period of time. If this type of cell does not respond satisfactorily after a long period of storage or idleness, short-circuit it; short-circuiting will not affect the cell adversely.

6. Terminals

Terminals of various types are used on dry batteries. The type of terminal used for any given battery is determined by the application of the battery. The following are typical terminal types: flat surface terminals (fig. 16), flexible lead terminals (fig. 17), stud and nut terminals (fig. 18), spring clip terminals (fig. 19), cable connector terminals (fig. 20), snap fastener terminals (fig. 21), socket terminals (fig. 22), and flat spring and coil spring terminals (fig. 23).

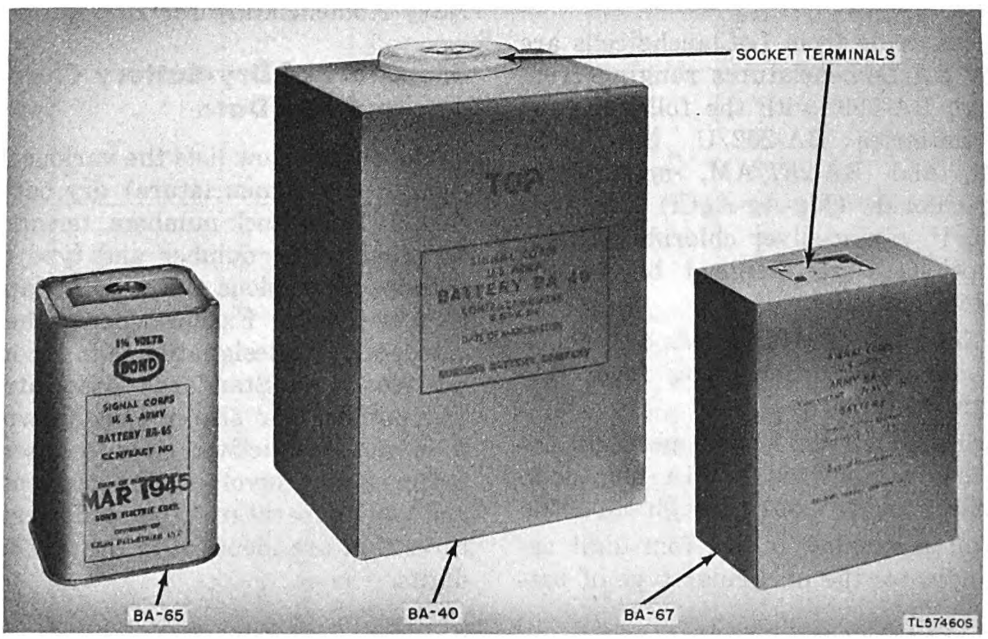

Figure 22. Socket terminals.

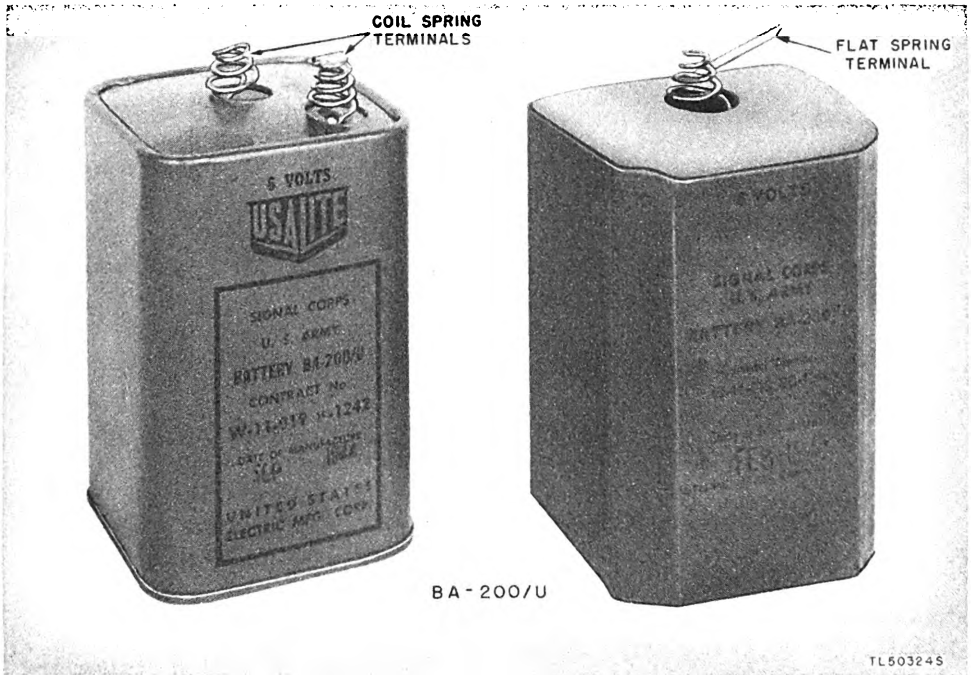

Figure 23. Flat spring and coil spring terminals.

7. Army-Navy Nomenclature for Dry Batteries

Army-Navy dry batteries are identified by the symbol BA and a number which signifies the type of dry battery. Battery nomenclature is assigned through the office of the Chief Signal Officer, Washington, D.C., and is based on the following system:

a. Batteries made from LeClanche cells are identified by BA nomenclatures ranging from BA-1 through BA-999, with the following exceptions: Batteries BA-252/U, BA-253/U, BA-256/AM, and BA-257/AM, magnesium-silver-silver chloride (Mg-Ag-AgCl) type Battery BA-245/U, a zinc-silver chloride battery. These exceptions were assigned before the present system was adopted.

b. Batteries made from RM cells are identified by BA nomenclature ranging from BA-1001 through BA-1999.

c. Batteries made from low-temperature LeClanche cells are identified by BA nomenclatures ranging from BA-2001 through BA-2999.

d. The initial number in the four-digit assignments indicates the particular type of battery construction. For example, Battery BA-38 indicates a battery of conventional LeClanche construction; Battery BA-1038/U indicates the same battery with RM type cells; Battery BA-2038/U denotes the same battery with low-temperature LeClanche type cells. For additional information on dry-battery nomenclature, refer to SB 11–110, Change in Army-Navy Nomenclature for Dry Batteries.

8. Chart of Dry-Battery Characteristics and Test Data

The chart below lists the various JAN (Joint Army-Navy nomenclature) dry batteries, their Signal Corps stock numbers, terminal voltages, terminal types, number and type of cells per battery, dimensions and weights, and specification test data. Except where otherwise indicated, cell size designation is in accordance with the American Standards Association System. The number and size of cells shown in column 5 is not restrictive. Where interchangeable batteries are involved, the conventional, RM, and low-temperature types will carry nomenclatures that are identical in the last two or three digits.

Dry-battery characteristics and test data

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.)				Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A)					JAN Battery
											Discharge Schedule	Service life				
												3 mo		9 mo	12 mo	
					Length	Width	Over-all height	Body height				Normal	High Temp			
BA-1	3A1	3	Flat surface.	2 E	Diam: $1\frac{11}{32}$		$6\frac{1}{16}$	6	8.6	0.63	Discharge through 13.33 ohms—4 minutes each ¼ hour, 10 hours per day, 5 days per week—to and end voltage of 1.87 volts. *Leakage test:* 10 ohms.[2]	8.0 days	5.6 days	....	7.2 days	BA-1
BA-2 BA-1002/U BA-2002/U[3]	3A2 3A275-1002 3A275-2002	22.5 23.4 22.5	Flexible lead	15 A 18 RM-3 15A	$3\frac{1}{2}$	$2\frac{3}{32}$	$3\frac{1}{2}$	$2\frac{21}{32}$	22.2	1.25	Discharge continuously through 2,500 ohms to an end voltage of 17.0 volts.	80 hr 200 hr 80 hr	56 hr 140 hr	....	72 hr 180 hr 7.0 hr	BA-2 BA-1002/U BA-2002/U[3]
BA-8	3A8	22.5	Flexible lead.	15 D	$6\frac{11}{16}$	$4\frac{1}{8}$	$3\frac{1}{2}$	$3\frac{1}{8}$	96.6	4.5	Discharge continuously through 1,250 ohms to an end voltage of 17.0 volts.	220 hr	146 hr	....	195 hr	BA-8
BA-9	3A9	4.5	Flat spring.	3 B	$2\frac{17}{32}$	$\frac{7}{8}$	$3\frac{1}{16}$	$2\frac{5}{8}$	6.8	0.38	Discharge through 20 ohms—4 minutes each hour, 10 hours per day, 5 days per week—to an end voltage of 2.8 volts.	8.0 days	4.8 days	....	6.4 days	BA-9
BA-15-A BA-1015/U BA-2015/U[3]	3A15A 3A275-1015 3A275-2015	1.5 1.3 1.5	Stud and nut	2 F 10 RM-3 2 F	$2\frac{11}{16}$	$1\frac{3}{8}$	$4\frac{33}{64}$	$4\frac{1}{16}$	16.7	0.88	Discharge continuously through 10 ohms to an end voltage of 0.9 volts.	90 hr 175 hr 9 hr	63 hr 123 hr	....	81 hr 160 hr 8 hr	BA-15-A BA-1015/U BA-2015/U[3]
BA-23	3A23	1.5	Stud and nut	1 No. 6	Diam: $2\frac{5}{8}$		$6\frac{37}{64}$	$6\frac{1}{8}$	33.1	2.38	Discharge through 2.66 ohms for 2 periods of 1 hour each daily to an end voltage of 0.9 volt; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-23
BA-26 BA-2026/U[3]	3A26 3A275-2026	22.5, 45	Spring clip.	30 F	$8\frac{1}{4}$	$4\frac{1}{2}$	$7\frac{15}{16}$	$7\frac{3}{8}$	294.7	13.75	Discharge continuously through 13.75 ohms to an end voltage of 34.0 volts.	330 hr 33 hr	230 hr	....	295 hr 29 hr	BA-26 BA-2026/U[3]
BA-27 BA-2027/U[3]	3A27 3A275-2027	−1.5, −3, −4.5	Stud and nut	3 D	$4\frac{1}{16}$	$1\frac{1}{2}$	$3\frac{37}{64}$	$3\frac{1}{8}$	21.8	1	Discharge through 20 ohms—4 minutes per hour, 10 hours per day, 5 days per week—to an end voltage of 2.8 volts.	30 days 3 days	20 days	....	25 days 2.5 days	BA-27 BA-2027/U[3]

Dry-battery characteristics and test date—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-28 BA-2028/U[3]	3A28 3A275-2028	4.5	Flat Spring	3 A	2 1/16	11/16	2 3/4	2 5/16	4.1	0.31	Discharge through 50 ohms—4 minutes per hour, 10 hours per day, 5 days per week—to an end voltage of 2.8 volts.	10.5days 1.0 day	6 days	....	8.4 days 0.8 day	BA-28 BA-2028/U[3]
BA-30 BA-2030/U[3]	3A30 3A275-2030	1.5	Flat surface	1 D	Diam: 1 11/32		2 13/32	2 11/32	3.4	0.25	Discharge two batteries in series through 13.33 ohms—4 minutes each ½ hour, 10 hours per day, 5 days per week—to an end voltage of 1.87 volts. *Leakage test:* Two batteries in series through 10 ohms.[2]	14 days 1.4 days	9 days	....	12 days 12 days	BA-30 BA-2030/U[3]
BA-31 BA-2031/U[3]	3A31 3A275-2031	4.5	Stud and nut	3 B	2 17/32	7/8	3 11/64	2 23/32	7	0.38	Discharge through 20 ohms—4 minutes each hour, 10 hours per day, 5 days per week—to an end voltage of 2.8 volts.	8 days 0.8 day	6.4 days	....	4.8 days 0.6 day	BA-31 BA-2031/U[3]
BA-33 BA-1033/U BA-2033/U[3]	3A33 3A275-1033 3A275-2033	45, 135 46.8, 135.2 45,135	Stud and nut.	90 A 104 RM-3 90 A	6 1/4	3 9/16	5 51/64	5 3/16	127.4	6.5	Discharge continuously through 15,000 ohms to an end voltage of 100 volts.	80 hr 230 hr 8 hr	56 hr 138 hr	....	72 hr 200 hr 7 hr	BA-33 BA-1033/U BA-2033/U[3]
BA-34 BA-2034/U[3]	3A34 3A275-2034	−1.5, −3, −4.5, −6, −7.5	Stud and nut; −7.5 terminal is flexible lead.	5 B	4 1/8	15/16	3 31/64	2 7/8	112.8	0.63	Discharge through 35 ohms— 4 minutes per hour, 10 hours per day, 5 days per week —to an end voltage of 4.5 volts.	8 days 0.8 day	4.8 days	....	6.5 days 0.6 day	BA-34 BA-2034/U[3]
BA-35 BA-1035/U BA-2035/U[3]	3A35 3A275-1035 3A275-2035	1.5 1.3 1.5	Stud and nut.	4 F 25 RM-3 4 F	2 5/8	2 5/8	4 29/64	4 1/16	30.7	1.5	Discharge through 5 ohms for 2 periods of 1 hour each daily to an end voltage of 0.9 volt; not less than 6 hours between periods.	110 hr 175 hr 11 hr	75 hr 123 hr	....	100 hr 160 hr 10 hr	BA-35 BA-1035/U BA-2035/U[3]
BA-36 BA-1036/U	3A36 3A275-1036	22.5, 45 23.4, 46.8	Stud and nut.	30 B 36 RM-3	4 1/4	2 9/16	6 31/64	5 7/8	70.6	3.38	Discharge continuously through 3,000 ohms to an end voltage of 34 volts.	60 hr 135 hr	36 hr 80 hr	....	50 hr 120 hr	BA-36 BA-1036/U

Dry-battery characteristics and test date—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	High Temp	9 mo	12 mo	JAN Battery
BA-37 BA-1037/U	3A37 3A275-1037	1.5 1.3	Flat surface	1 J 7 RM-3	Diam: 1 11/32		6 7/32	6 5/32	8.4	0.69	Discharge continuously through 5 ohms to an end voltage of 1.0 volt. *Leakage test:* 3 ohms[2].	15 hr 33 hr	10.5 hr 23 hr	....	13.5 hr 30 hr	BA-37 BA-1037/U
BA-38 BA-1038/U BA-2038/U[3]	3A38 3A275-1038 3A275-2038	103.5 93.6 103.5	Flat surface.	69 N 72 RM-1 69 N	1 11/32	1 11/32	11 23/32	11 21/32	21.2	1.25	Discharge 2 minutes through 3,000 ohms, 4 minutes through 8,000 ohms; repeat cycle continuously to an end voltage of 65 volts (reading taken on 2-minute discharge).	6 hr 30 hr 0.6 hr	2 hr 15 hr	4.5 hr 22 hr 0.45 hr	....	BA-38 BA-1038/U BA-2038/U[3]
BA-39 BA-1039/U BA-2039/U[3]	3A39 3A275-1039 3A275-2039	7.5 A unit 150 B unit 7.8 A unit 156 B unit 7.5 A unit 150 B unit	5-hole socket.	5 F 100 A 30 RM-3 120 RM-3 5 F 100 A	6 1/2	3 3/16	7 9/16	7 1/8	187.4	8.75	Discharge each unit through the resistances listed below for 2 minutes, then 4 minutes open circuit. Repeat cycle continuously to given end voltage. *Unit* *Resistance* *End voltage* A 37.5 ohms 5.5 volts B 3,600 ohms 110 volts	40 hr 150 hr 4 hr	24 hr 85 hr	....	35 hr 130 hr 3.5 hr	BA-39 BA-1039/U BA-2039/U[3]
BA-40 BA-1040/U BA-2040/U[3]	3A40 3A275-1040 3A275-2040	1.5 A unit 90 B unit 1.3 A unit 93.6 B unit 1.5 A unit 90 B unit	4-hole socket	4 G 60 B 18 RM-3 72 RM-3 4 G 60 B	5 7/16	4 9/32	7 9/16	6 1/8	176	0.012	Discharge the A unit through 1.4 ohms continuously. Discharge the B unit through 1,560 ohms for 2 minutes and then through 2,600 ohms for 4 minutes. Repeat the cycle continuously to a given end voltage (1.1 volts for the A unit and 65 volts for the B unit). Take voltage readings on 2-minute discharge.	9 hr 42 hr 0.9 hr	5 hr 25 hr	....	7.5 hr 38 hr 0.75 hr	BA-40 BA-1040/U BA-2040/U[3]
BA-41	3A41	4.5 A unit 25.5 B_1 unit 60 B_2 unit	5-hole socket.	3 Short N 17 Short N 40 Short N	2 3/8	2 1/8	3 1/2	3 1/2	17.7	1	Discharge continuously with all three units in series through 80,000 ohms to an end voltage of 65 volts.	140 hr	77 hr	....	105 hr	BA-41

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-42	3A42	1.5	Flat surface.	1 C	Diam. 1 1/32		1 15/16	1 7/8	1.7	0.125	Discharge two batteries in series through 15 ohms—4 minutes each hour, 10 hours per day, 5 days per week—to an end voltage of 1.87 volts. *Leakage test:* Two batteries in series through 15 ohms[2].	12 days	7.2 days	....	10 days	BA-42
BA-43 BA-1043/U	3A43 3A275-1043	1.5 A unit 90 B unit -45 C unit 1.3 A unit 91 B unit -42.9 C unit	8-hole socket.	4 F 60 AA 30 N 15 RM-3 70 RM-2 33 RM-1	3 7/8	3 31/32	7 1/4	7 1/16	37	5.13	Discharge through the resistance listed below, 10 hours per day, to the specified end voltage. *Unit* *Resistance* *End voltage* A 4.3 ohms 1.1 v B 7,500 ohms 67 v C 40,000 ohms 35 v	45 hr 62 hr	24 hr 34 hr	....	34 hr 58 hr	BA-43 BA-1043/U
BA-44	3A44	6	Stud and nut.	4 No. 6	10 1/2	2 3/4	7 27/64	6 13/16	214.3	10	Discharge through 10.67 ohms for 2 periods of 1 hour each daily to an end voltage of 3.6 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-44
[4]BA-45	3A45	1.25	Flat cap	1 Bias cell	Diam. 16/32		3/8	3/8	0.29	0.006	Discharge continuously through 5 megohms to an end voltage of 1.0 volt.	30 days	....	....	22.5days	[4]BA-45
BA-48 BA-1048/U BA-2048/U[3]	3A48 3A275-1048 3A275-2048	1.25 A unit 90 B unit 1.3 A unit 93.6 B unit 1.5 A unit 90 B unit	4-hole socket	6 CD 60 A 14 RM-3 72 RM-2 6 CD 60 A	10	2 7/32	4 7/8	4 7/8	108.4	5.5	Discharge through the resistances listed below 5 hours per day, 5 days per week to the given end voltage. *Unit* *Resistance* *End voltage* A 5 ohms 1.1 v B 9,000 ohms 65 v	80 hr 95 hr 8 hr	48 hr 57 hr	....	65 hr 88 hr 6 hr	BA-48 BA-1048/U BA-2048/U[3]

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.)				Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A)					JAN Battery
												Service life				
												3 mo		9 mo	12 mo	
					Length	Width	Over-all height	Body height			Discharge Schedule	Normal	High Temp			
BA-49 BA-1049/U	3A49 3A-275-1049	1.5 A unit 67.5 B_1 unit 67.5 B_2 unit 1.3 A unit 70.2 B_1 unit 70.2 B_2 unit	5-hole socket.	2 E 45 N 45 N 8 RM-2 54 RM-1 54 RM-1	5 9/16	1 1/2	6 9/16	6 9/16	54.8	3.19	Discharge 2 minutes through first resistance and 4 minutes through the second resistance to the given end voltage (B_1 and B_2 are connected in series). *Unit* / *1st R* / *2d R* / *Unit voltage* A: 3.0 ohms / 4.3 ohms / 1.1 v B_1 and B_2: 3,000 ohms / 13,500 ohms / 100 v	11 hr 17 hr	5.5 hr 8.5 hr	8.25 hr 14 hr	....	BA-49 BA-1049/U
BA-50	3A50	3	Coilspring and flat surface.	2 AA	1 5/32	19/32	2 7/16	2 1/16	1.7	0.094	Discharge continuously through 12 ohms to an end voltage of 1.8 volts.	28 min	15 min	21 min	....	BA-50
BA-51	3A51	67.5	Snap fastener.	45 N	2 25/32	1 3/8	3 3/4	3 11/16	25.5	0.88	Discharge 2 minutes through 2,000 ohms, 4 minutes through 5,200 ohms; repeat cycle continuously to an end voltage of 42 volts.	6 hr	3 hr	4.5 hr	....	BA-51
BA-53 BA-1053/U BA-2053/U[3]	3A53 3A275-1053 3A275-2053	22.5, 45 23.4, 46.8 22.5, 45	Stud and nut	30 AA 72 RM-1 30 AA	3 1/16	1 15/16	5 15/64	4 5/8	33.2	1.63	Discharge through 3,800 ohms continuously to an end voltage of 34 volts.	25 hr 115 hr 2.5 hr	15 hr 69 hr	20 hr .... 2 hr	.... 100 hr	BA-53 BA-1053/U BA-2053/U[3]
BA-56	3A56	45	Snap fastener.	30 N	2 5/8	1	3 11/16	3 39/64	9.7	0.63	Discharge through 1,500 ohms for 2 minutes, then through 3,500 ohms for 4 minutes. Repeat cycle continuously to an end voltage of 28 volts. Take readings on 2-minute discharge.	6 hr	3 hr	4.5 hr	....	BA-56
BA-58 BA-2058/U[3]	3A58 3A275-2058	1.5	Flat surface.	1 AA	Diam: 37/64		1 31/32	1 29/32	0.5	0.0375	Discharge 2 batteries in series 4 minutes each hour, 10 hours per day, 5 days per week to an end voltage of 1.87 volts. *Leakage test:* Two batteries in series through 20 ohms[2].	10 days 1 day	6 days	8 days 0.8 day	....	BA-58 BA-2058/U[3]

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-59 BA-1059/U	3A59 3A275-1059	45 46.8	5-hole socket.	30 BB 36 RM-1	3 19/32	1 13/16	5 1/2	5 1/2	35.8	2	Discharge through 1,500 ohms continuously to an end voltage of 34 volts.	10 hr 34 hr	6 hr 20 hr	....	9 hr 30 hr	BA-59 BA-1059/U
BA-63 BA-1063/U BA-2063/U[3]	3A63 3A275-1063 3A275-2063	22.5, 45 23.4, 46.8 22.5, 45	5-hole socket.	30 AA 72 RM-1 30 AA	3	2 5/16	4 1/8	4 1/8	41	1.5	Discharge through 3,800 ohms continuously to an end voltage of 34 volts.	25 hr 115 hr 2.5 hr	15 hr 69 hr	20 hr .... 2 hr	.... 100 hr	BA-63 BA-1063/U BA-2063/U[3]
BA-65 BA-2065/U[3]	3A65 3A275-2065	1.5	2-hole socket.	4 F	2 5/8	2 5/8	4 1/16	4 1/16	28	1.5	Discharge through 5 ohms for 2 periods of 1 hour each daily to an end voltage of 0.9 volt; not less than 6 hours between periods.	110 hr 11 hr	75 hr	....	100 hr 10 hr	BA-65 BA-2065/U[3]
BA-67	3A67	3 A unit 90 B unit	5-hole socket.	8 R 60 P	4 1/16	1 15/16	4 9/16	4 9/16	21	1.56	Discharge A unit through 160 ohms and B unit through 7,500 ohms continuously to and end voltage of 2.2 volts for A unit and 68 volts for B unit.	3.25 hr	1.75 hr	2 hr	....	BA-67
BA-70 BA-2070/U[3]	3A70 3A275-2070	4.5 A unit 90 B_1 unit 60 B_2 unit	8-hole socket.	9 G 60 B 40 B	10 3/8	4 9/16	8 1/4	7 7/8	393	16	Discharge A unit through 10 ohms for 2 minutes, then through 16 ohms for 4 minutes. Discharge B_1 unit through 3,300 ohms continuously. Connect 3,300 ohms across B_1 unit; connect the B_1 and B_2 units in series; discharge the series; discharge the series connection through 2,800 ohms for 2 minutes and then open the circuit for 4 minutes. Start all tests simultaneously and run concurrently all 2- and 4-minute periods, respectively. Repeat cycles until one of the following end voltages is reached: *Unit* — *End voltage* A — 3.6 v B_1 — 65 v B_1 and B_2 in series — 110 v	15 hr 1.5 hr	9 hr	....	14 hr 1.4 hr	BA-70 BA-2070/U[3]

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.)				Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A)					JAN Battery
					Length	Width	Over-all height	Body height			Discharge Schedule	Service life: 3 mo Normal	3 mo High Temp	9 mo	12 mo	
BA-200/U BA-2200/U[3]	3A275-200 3A275-2200	6	Coil and flat spring or 2 coil springs.	4 F	2 11/16	2 11/16	4 3/8	3 15/16	31.6	1.5	Discharge through 40 ohms continuously to an end voltage of 4 volts.	20 hr 2 hr	14 hr	....	18 hr 1.8 hr	BA-200/U BA-2200/U[3]
BA-202/UF	3A275-202	1.5	Flat surface.	1 D	Diam: 1 11/32		2 7/16	2 3/8	3.4	0.25	Discharge 2 batteries in series through 0.3 ohm for 10 discharges at 2-minute intervals during the first part of the cycle. Nine discharges shall be of 1-second duration, the tenth of 2-second duration; make each discharge period at the beginning of the 2-minute interval. Each cycle comprises 10 discharges per hour, to be repeated continuously to an end voltage of 1.0 volt.	60 cyc	15 cyc	....	30 cyc	BA-202/UF
BA-210/U BA-1210/U BA-2210/U[3]	3A275-210 3A275-1210 3A275-2210	6 6.5 6	2-hole socket	4 F 25 RM-3 4 F	2 5/8	2 5/8	4 1/16	4 1/16	28	1.5	Discharge through 40 ohms continuously to an end voltage of 4 volts.	20 hr 65 hr 2 hr	14 hr 45.5 hr	....	18 hr 57 hr 1.8 hr	BA-210/U BA-1210/U BA-2210/U[3]
BA-211/U BA-1211/U	3A275-211 3A275-1211	−3, −4.5, −16.5, −22.5 −2.6, −3.9, −16.9, −23.4	5-hole socket.	15 B 18 RM-3	4 1/8	2 19/32	3	3	32.3	1.5	Discharge through 1,500 ohms continuously to an end voltage of 17 volts.	60 hr 140 hr	36 hr 84 hr	....	50 hr 125 hr	BA-211/U BA-1211/U
BA-212/U	3A275-212	1.5 A unit 90 B unit	4-hole socket.	18 F 60 D	15 7/8	4 9/16	7	7	507	24	Discharge A unit through 3 ohms and B unit through 6,000 ohms—10 hours per day, 5 days per week—to an end voltage of 1.1 volts for A unit or 65 volts for B unit.	25 days	15 days	....	18 days	BA-212/U

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-216/U	3A275-216	4.5	Spring clip.	12 F	$3\frac{15}{16}$	$3\frac{15}{16}$	$5\frac{15}{16}$	$5\frac{7}{16}$	92	4.5	Discharge through 15 ohms for two 1-hour periods daily to an end voltage of 2.7 volts; not less than 6 hours between periods.	110 hr	75 hr	....	100 hr	BA-216/U
BA-218/U	3A275-218	3 A_1 unit 1.5 A_2 unit 156 B unit −7.5 C unit	5-hole socket.	6 F 15 B 104 B 5 B	$9\frac{3}{8}$	$6\frac{9}{16}$	$4\frac{3}{8}$	$4\frac{3}{8}$	269	15	Discharge alternately for 15 minutes each through the resistances listed below to the given end voltage: *Unit* — *1st R* A_1 — 7.5 ohms A_2 — 7.5 ohms B — 5,200 ohms C — 375 ohms *2d R* — *End voltage* 10 ohms — 2.3 v 10 ohms — 1.25 v 9,800 ohms — 125 v. Open circuit — −6.5 v	25 hr	13 hr	....	17.5 hr	BA-218/U
BA-203/U BA-1203/U BA-2203/U[3]	3A275-203 3A275-1203 3A275-2203	6 6.5 6	Socket.	8 F 55 RM-3 8 F	$3\frac{15}{16}$	$2\frac{25}{32}$	$5\frac{9}{16}$	$5\frac{9}{16}$	60.9	3.25	Discharge through 40 ohms for 2 periods of 1 hour each daily to an end voltage of 3.6 volts; not less than 6 hours between periods.	110 hr 150 hr 11 hr	75 hr 110 hr	....	100 hr 130 hr 10 hr	BA-203/U BA-1203/U BA-2203/U[3]
BA-204/U BA-2204/U[3]	3A275-204 3A275-2204	3	2-hole socket.	2 F	$2\frac{11}{16}$	$1\frac{3}{8}$	$4\frac{3}{8}$	$4\frac{5}{16}$	16.1	0.88	Discharge through 1.6 ohms for 1 minute each hour, 10 hours per day, 5 days per week to an end voltage of 1.8 volts	3.5 days 0.3 day	2.0 days	....	3.1 days 0.25 day	BA-204/U BA-2204/U[3]
BA-205/U BA-2205/U[3]	3A275-205 3A275-2205	3	Stud and nut.	2 F	$2\frac{11}{16}$	$1\frac{3}{8}$	$4\frac{39}{64}$	4	17	0.88	Discharge through 20 ohms continuously to an end voltage of 2 volts.	20 hr 2 hr	14 hr	....	18 hr 1.8 hr	BA-205/U BA-2205/U[3]
BA-206/U	3A275-206	9	Stud and nut.	6 No. 6	$7\frac{7}{8}$	$5\frac{5}{16}$	$7\frac{27}{64}$	$6\frac{13}{16}$	325	15.5	Discharge through 16 ohms for 2 periods of 1 hour each, daily, to an end voltage of 5.4 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-206/U

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-207/U	3A275-207	9	Stud and nut.	24 F	8 9/16	4 1/16	5 15/16	6 35/64	206.5	9.5	Discharge through 16 ohms for 2 periods of 1 hour each, daily, to an end voltage of 5.4 volts; not less than 6 hours between periods.	60 hr	42 hr	....	54 hr	BA-207/U
BA-208/U BA-1208/U	3A208 3A275-1208	3 2.6	Flat spring.	2 A 6 RM-1	1 7/16	3/4	2 5/8	2 5/16	2.8	.....	Discharge continuously through 330 ohms to an end voltage of 2.2 volts.	80 hr 250 hr	56 hr 150 hr	....	72 hr 215 hr	BA-208/U BA-1208/U
BA-209/U	3A209	3	Flat surface.	2 C	Diam: 1 1/32		3 15/16	3 7/8	3.3	.....	Discharge through 15 ohms for 4 minutes each hour, 10 hours per day, 5 days per week to an end voltage of 1.87 volts. *Leakage test:* 15 ohms continuous[2].	12 days	7.2 days	....	10 days	BA-209/U
BA-220/U	3A275-220	1.5 A unit 90 B unit	4-hole socket.	4 CD 60 B	8 1/8	2 11/32	4 25/32	4 25/32	91	5	Discharge continuously through resistances listed below to the given end voltage: *Unit* *R* *End voltage* A 7.5 ohms 1.1 v B 9,000 ohms 65 v	57 hr	34 hr	....	40 hr	BA-220/U
BA-221/U	3A275-221	1.5 A unit 67.5 B_2 unit tapped from 135 B_1 unit −6 C unit	5-hole socket.	8 M 90 N 4 M	3 31/32	1 27/32	6 9/16	6 9/16	44.2	2.25	Discharge alternately for 2 minutes each through resistances— *Unit* *1st R* A 6.5 ohms B_1 Open circuit B_2 5,200 ohms C Open circuit *2d R* *End voltage* 65 ohms 1.0 v 5,870 ohms 45 v 16,900 ohms 90 v 200 ohms −4 v	210 min	100 min	155 min	....	BA-221/U
BA-222/U BA-1222/U BA-2222/U[3]	3A275-222 3A275-1222 3A275-2222	6 6.5 6	Stud and nut.	16 F 80 RM-3 16 F	8 1/4	2 3/4	6 27/64	5 13/16	145.7	5.38	Discharge through 20 ohms for 2 periods of 1 hour each daily to an end voltage of 36 volts; not less than 6 hours between periods.	110 hr 145 hr 11 hr	75 hr 102 hr	....	100 hr 130 hr 10 hr	BA-222/U BA-1222/U BA-2222/U[3]

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.)				Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A)					JAN Battery
					Length	Width	Over-all height	Body height			Discharge Schedule	Service life				
												3 mo		9 mo	12 mo	
												Normal	High Temp			
BA-223/U BA-2223/U[3]	3A275-223 3A275-2223	22.5, 45	3-hole socket.	30 B	4 1/8	2 5/8	5 3/8	5 3/8	58.2	3	Discharge continuously through 3,000 ohms to an end voltage of 34 volts.	60 hr 6 hr	36 hr	....	50 hr 5 hr	BA-223/U BA-2223/U[3]
BA-225/U BA-2225/U[3]	3A275-225 3A275-2225	3	Spring clip.	8 F	3 15/16	2 11/16	6 3/16	5 9/16	70	3.25	Discharge through 15 ohms continuously to an end voltage of 1.8 volts.	140 hr 14 hr	100 hr	....	125 hr 12 hr	BA-225/U BA-2225/U[3]
BA-226/U	3A275-226	4.5	2-hole socket.	3 G	4	1 3/8	4 11/16	4 11/16	20.3	1.4	Discharge through 75 ohms continuously to an end voltage of 3.3 volts.	90 hr	60 hr	....	80 hr	BA-226/U
BA-227/U	3A275-227	3	2-hole socket.	4 AA	1 3/16	1 3/16	2 5/8	2 7/16	3.7	0.2	Discharge through 7.5 ohms for 1 minute; then open circuit for 1 hour, 59 minutes; repeat cycle continuously to an end voltage of 2.2 volts.	70 disch periods	40 disch periods	60 disch periods	....	BA-227/U
BA-228/U BA-1228/U	3A275-228 3A275-1228	22.5, 45 23.4, 46.8	Stud and nut.	30 P 36 RM-1	3	1 5/16	4 27/64	3 13/16	18	0.8	Discharge through 5,000 ohms continuously to an end voltage of 34 volts.	17 hr 70 hr	10 hr 38 hr	11 hr 58 hr	....	BA-228/U BA-1228/U
BA-230/U BA-2230/U[3]	3A275-230 3A275-2230	−3, −4.5, −6, −9, −10.5 −16.5, −22.5	Spring clip.	15 B	4 3/16	2 9/16	3 1/4	2 3/4	34.9	1.75	Discharge through 1,500 ohms continuously to an end voltage of 17 volts.	60 hr 6 hr	36 hr	....	50 hr 5 hr	BA-230/U BA-2230/U[3]
BA-231/U BA-2231/U[3]	3A275-231 3A275-2231	1.5 1.3	2-hole socket.	1 F 5 RM-3	Diam: 1 11/32		4 1/8	4 1/16	5.9	0.5	Discharge through 15 ohms, 5 hours per day, 5 days per week, to an end voltage of 1.0 volt.	40 hr 100 hr	25 hr 70 hr	....	35 hr 90 hr	BA-231/U BA-2231/U[3]
BA-232/U BA-1232/U BA-2232/U[3]	3A275-232 3A275-1232 3A275-2232	22.5 23.4 22.5	3-hole socket.	15 N 18 RM-1 15 N	1 5/8	1 3/8	3	3	6.7	0.31	Discharge through 7,500 ohms, 5 hours per day, 5 days per week, to an end voltage of 17 volts.	100 hr 230 hr 10 hr	50 hr 130 hr	75 hr 210 hr 7 hr	....	BA-232/U BA-1232/U BA-2232/U[3]
BA-233/U BA-1233/U	3A275-233 3A275-1233	33 33.8	3-hole socket.	22 N 26 RM-1	2 1/16	1 3/8	3	3	8.5	0.38	Discharge through 11,000 ohms, 5 hours per day, 5 days per week, to an end voltage of 25 volts.	100 hr 230 hr	50 hr 130 hr	75 hr 210 hr	....	BA-233/U BA-1233/U

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Max dimen (in.) Width	Max dimen (in.) Over-all height	Max dimen (in.) Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	Service life 3 mo High Temp	Service life 9 mo	Service life 12 mo	JAN Battery
BA-234/U BA-1234/U BA-2234/U[3]	3A275-234 3A275-1234 3A275-2234	45 46.8 45	3-hole socket.	30 N 36 RM-1 30 N	2 1/16	1 3/8	3 7/8	3 7/8	14.5	0.5	Discharge through 15,000 ohms, 5 hours per day, 5 days per week, to an end voltage of 34 volts.	100 hr 230 hr 10 hr	50 hr 130 hr	75 hr 210 hr 7 hr	....	BA-234/U BA-1234/U BA-2234/U[3]
BA-235/U	3A275-235	13.5	Flexible lead.	9 No. 6	7 15/16	7 15/16	6 7/8	6 7/8	433	23.5	Discharge through 24 ohms for two 1-hour periods daily to an end voltage of 7.65 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-235/U
BA-236/U	3A275-236	9.0	Stud and nut.	6 No. 6	7 7/8	5 5/16	7 31/64	6 7/8	626	15.5	Discharge through 16 ohms for two 1-hour periods daily to an end voltage of 5.1 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-236/U
BA-237/U	3A275-237	1.5 A unit 90 B unit 4.5 C unit with 30-V tap	8-prong plug and 12-hole socket.	4 AA 60 FL-2 6 AA	Diam: 4.031		2.625	2.625	36.3	1.6	Discharge continuously through resistances listed below to the given end voltage: *Unit* — *R* — *End voltage* A — 3.7 ohms — 1.25 v B — 200,000 ohms — 80.0 v C — 6.0 ohms — 3.3 v 3-v tap — Open circuit	150 sec	90 sec	112 sec	....	BA-237/U
BA-238/U	3A275-238	1.5 A unit 198 B unit with taps at 150 v and 40.5 v	Cable and cable connector	16 F 132 B	10.374	5.374	[5]6.999	6.999	390	21	Discharge continuously through resistances listed below to given end voltage: *Unit* — *R* — *End voltage* A — 15 ohms — 1.0 v B — 200,000 ohms — 165 v	50 days[6]	30 days	....	42 days	BA-238/U
BA-239/U	3A275-239	67.5, 73.5, 135	Terminal strip.	90 B	10.446	2.718	6.92	6.92	296.5	10	Discharge continuously through 875,000 ohms to an end voltage of 124 volts.	115 days[6]	65 days	....	90 days	B-239/U

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-241/U	3A275-241	1.5 A unit 135 B_1 unit with taps at 60 and 22.5 v 202.5 B_2 unit with tap at 40.5 1.5 C unit 12 S unit	Cable and cable connector.	34 G 90 FL-1 135 FL-8 2 B 8 D	8.062	6.832	9.562	9.562	526.7	32	Discharge continuously through resistances listed below to given end voltage: *Unit* — *R* — *End voltage* A — 8.3 meg — 0.9 v B_1 — 9 meg — 125 v B_2 — 0.5 meg — 160 v 40.5-v tap — 2.7 meg — 31 v C — Open circuit — −13 v S — 20,000 ohms — 10.5 v	90 days[6]	45 days	67.5 days	....	BA-241/U
BA-242/U	3A275-242	3.0	Stud and nut.	4 No. 6	5⅝16	5⅝16	7¼	6⅞	204.6	10	Discharge through 2.66 ohms for two 1-hour periods daily to an end voltage of 1.7 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-242/U
BA-243/U	3A275-243	1.5 A unit 306 B unit	Socket.	4 F 204 FL-1	Diam: 3.25		6.75	6.75	56	3	Discharge A unit through 13 ohms and B unit through 600,000 ohms continuously to an end voltage of 1.25 volts for A unit and 225 volts for B unit	96 hr	....	72 hr	....	BA-243/U
BA-244/U	3A275-244	1.5 A unit 67.5 B unit 7.5 C unit	Stud and nut.	4 F 45 A 5 A	4⅜	3 13/16	6 59/64	6 5/16	6.5	4.25	Discharge 5 hours per day, 5 days per week, through resistances listed below to given end voltages: *Unit* — *R* — *End voltage* A — 7.5 ohms — 1.1 v B — 7,500 ohms — 50 v C — 833.3 ohms — 5.5 v	90 hr	60 hr	....	81 hr	BA-244/U

Dry-battery characteristics and test data—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt)	Terminal types (see JAN-B-18A)	No. and size of cells[1]	Max dimen (in.) Length	Width	Over-all height	Body height	Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A) Discharge Schedule	Service life 3 mo Normal	3 mo High Temp	9 mo	12 mo	JAN Battery
BA-248/U	3A275-248	270 B unit with taps at 208.5 and 67.5 v 12 S_1 unit 12 S_2 unit	Cable and cable connector	180 B 8 D 8 D	Diam: 9.167		[8]8.310	8.310	548	31	Discharge continuously through the resistances listed below to the given end voltage: *Unit* — *R* B — 1.75 ohms S_1 — 20,000 ohms S_2 — 20,000 ohms *End voltage* 248 v 10.5 v 10.5 v	115 days[6]	65 days	....	90 days	BA-248/U
BA-249/U	3A275-249	6	Stud and nut.	4 No. 6	10 7/16	2 3/4	7 27/64	6 13/16	213	10	Discharge through 10.66 ohms for two 1-hour periods daily to an end voltage of 3.4 volts; not less than 6 hours between periods.	75 hr	55 hr	....	70 hr	BA-249/U
BA-250/U	3A275-250	1.5 A unit 178.5 B_1 unit with taps at 135 v and 67.5 v. 180 B_2 unit with taps at 135 v 3 C unit	Socket, cable, and cable connector	8 AA 119 FL-1 120 FL-2 2 AA	Diam: 4.175		[5]5 3/8	5 3/8	73.6	5.5	Discharge continuously through resistances listed below to given end voltages: *Unit* — *R* A — 2.5 ohms B_1 — 170,000 ohms 135-v tap — 500,000 ohms 67.5-v tap — 65,000 ohms B_2 — 9,000 ohms 135-v tap — 16,000 ohms C — Open circuit *End voltage* 1.25 v 170 v 130 v 65 v 153 v 115 v 3.0 v	75 sec	35 sec	56 sec	....	BA-250/U
BA-251/U	3A275-251	1.5, 3	Flexible leads.	2 B	1 21/32	27/32	3 1/32	2 21/32	3.9	0.25	Discharge continuously through 300,000 ohms. The voltage should not fall below 3 volts before the required service life is completed. Measure the voltage with a potentiometer or a vacuum-tube voltmeter with input resistance of at least 10 megohms.	365 days	210 days	....	....	BA-251/U

Dry-battery characteristics and test date—(continued)

JAN Battery	Signal Corps stock No.	Terminal voltage (volt	Terminal types (see JAN-B-18A)	No. and (size of) cells[1]	Max dimen (in.)				Max vol (cu in.)	Max wt (lb)	Specification test data (JAN-B-18A)					JAN Battery
					Length	Width	Over-all height	Body height			Discharge Schedule	Service life				
												3 mo		9 mo	12 mo	
												Normal	High Temp			
BA-1246/U	3A275-1246	62.4	Snap-on type.	48 RM-1	2 25/32	1 7/16	3 11/16	3 5/8	14.75	1	Discharge through 2,000 ohms for 2 minutes, then through 5,200 ohms for 4 minutes; repeat continuously to an end voltage of 42 volts; take readings during 2-minute discharge.	22 hr	11 hr	....	16 hr	BA-1246/U
BA-1247/U	3A275-1247	{1.3 A unit 97.5 B unit}	Socket type	{30 RM-1 75 RM-1}	Diam: 2 1/16		9	9	33	2	Discharge A unit through 2 ohms and B unit through 4,300 ohms continuously to an end voltage of 1 volt for A unit or 65 volts for B unit.	20 hr	10 hr	....	15 hr	BA-1247/U
BA-1080/U	3A275-1080	{5.2 A unit 91.0 B_1 unit 65 B_2 unit}	8-hole socket.	{32 RM-3 70 RM-3 50 RM-2}	10 3/8	4 9/16	5 1/8	4 3/4	242.6	10	Discharge A unit through 10 ohms for 2 minutes, then through 16 ohms for 4 minutes. Discharge B unit through 3,300ohms continuously. With 3,300 ohms connected across the B_1 unit, and the B_1 and B_2 units connected in series, discharge the series-connected B_1 and B_2 units through 2,800 ohms for 2 minutes; then open circuits for 4 minutes. Start all tests simultaneously and run concurrently all 2-minute and 4-minute periods, respectively. Repeat cycle until one of following end voltages is reached: *Unit* — *End voltage* A — 3.6 v B_1 — 65 v B_1 and B_2 connected in series — 110 v	30 hr	18 hr	....	25 hr	BA-1080/U

[1]A table of sizes of standard cells (fig. 1) follows this table.
[2]For the leakage test, the battery is discharged continuously through the resistance listed and then stored for 15 days; after this time the battery is examined for leakage.
[3]Service life figures shown for low-temperature batteries indicate the service required when the batteries are discharged at —40° F., after storage at 70° F., 50 percent relative humidity, for the prescribed time. In addition, the batteries are required to meet the initial and delayed service requirements of the conventional battery when discharged at 70° F.
[4]Nomenclature of BA-45 is Bias Cell, not Battery.
[5]These dimension do not include cable assembly which is part of the battery.
[6]In addition to service test requirements shown, battery is also required to meet the requirements of the accelerated test shown in JAN-B-18A.

Sizes of standard cells

Cell designation	Nominal dimensions: Diameter (in.)	Nominal dimensions: Can height (in.)	Approx. vol. (cu in.)	Approx. wt. (lb.)
No. 6	2 1/2	6	29.3	2.2
A	5/8	1 7/8	0.57	0.045
AA	17/32	1 7/8	0.42	0.033
B	3/4	2 1/8	0.95	0.077
BR	3/4	1 1/2	0.58	0.046
C	15/16	1 13/16	1.25	0.10
CD	1	3 3/16	2.51	0.20
D	1 1/4	2 1/4	2.76	0.22
E	1 1/4	2 7/8	3.52	0.28
F	1 1/4	2 7/8	3.52	0.28
FL-1	1/2	13/16	0.041	....
FL-2	17/32	15/16	0.055	....
FL-3	27/32	1 1/4	0.134	....
FL-4	27/32	1 1/4	0.217	....
FL-5	1 1/4	1 1/4	0.219	....
FL-6	1 1/4	1 1/4	0.235	....
FL-7	1 45/64	1 45/64	0.638	....
FL-8	1 11/16	1 11/16	0.713	....
G	1 1/4	4	4.92	0.94
J	1 1/4	5 7/8	7.20	0.6
K	17/32	1/2	0.113	0.009
M	17/32	3/4	0.160	0.012
N	7/16	1 1/16	0.166	0.013
P	17/32	1	0.222	0.018
NS	7/16	3/4	0.113	0.009
R	17/32	1 5/16	0.292	0.023
RM-1	0.610	0.533	0.16	0.028
RM-2	0.812	0.576	0.30	0.038
RM-3	0.973	0.620	0.46	0.053

SECTION II
USE OF DRY BATTERIES

9. Reasons for Use

Dry batteries have many applications (par. 11) because they meet tactical and equipment power requirements. The following features of dry batteries make their use as sources of electrical power more desirable than other power sources:

a. Dry batteries, as sources of power, are not dependent upon additional equipment to maintain their source of power. This feature makes dry batteries particularly desirable as a power source for equipment which must be used in the field or in other remote locations.

b. Dry batteries can provide a high concentration of electrical energy and, at the same time, be of light weight and occupy small space. This feature makes them suitable as a power source for equipment that must be portable during operations.

c. Dry batteries are easily and quickly installed and require no attention during operation; the operator is therefore completely free to perform other functions.

d. Dry batteries are generally instantaneously applicable, that is, they are ready for installation and use immediately upon being unpackaged.

e. Dry batteries operate noiselessly; this is an important security feature when and where tactical operations require that equipment be operated in proximity of, or even within, enemy territory.

10. Effects of Age, Storage, and Ambient Conditions on Use and Performance

a. AGE. Dry-cell batteries, except reserve LeClanche types and magnesium-silver-silver chloride types in their desiccated state, begin to deteriorate immediately upon completion of their assembly. The rate of deterioration is dependent upon the type of battery, its size, design, and storage conditions. All other factors being equal, newer batteries have greater capacity than older batteries. The time required for a battery to become inadequate for use is called the *shelf life* of the cell. Always consider the shelf life of a battery before placing it into use. For details of the shelf life of dry batteries, refer to *War Department Supply Bulletin SB 11–30, Shipment and Shelf Life Information, Testing, and Disposition of Dry Batteries.*

b. STORAGE. Storage conditions to which dry batteries are subjected affect the rate of deterioration and the actual amount of deterioration more seriously than age alone (*a* above). Shelf life, however, is determined by the combined effects of age and storage (par. 16 and SB 11–30).

c. AMBIENT CONDITIONS. The effect of operating conditions on dry batteries is dependent upon the type and kind of battery, the load on the battery, the schedule of use, and the degree of exposure to ambient conditions.

(1) *Conventional LeClanche batteries.* (*a*) The operating capacity of these batteries is not adversely affected by temperatures from 70° F. up to 120° F. provided the operating period is of reasonably short duration. Cells will deteriorate rapidly when used for long periods of time at the higher temperatures; the expected capacity will not be obtained, and in some cases the cells may leak badly. At temperatures lower than normal, the battery capacity will be less and will decrease as the operating temperatures decrease; at 0° F. the capacity will have decreased from 20 to 30 percent of the normal-temperature capacity; at —20° F. the batteries will have become gradually inoperative.

(*b*) The performance characteristics described in *(a)* above are for batteries that have actually attained the ambient temperature. If a battery at normal temperature is placed into equipment and used immediately upon exposure to low-temperature ambient conditions, its performance will be better than indicated in *(a)* above.

(2) *Low-temperature LeClanche batteries.* These low-temperature batteries perform very much like the conventional batteries at temperatures from 70° F. and above except that they depreciate faster and to a greater degree than do conventional batteries. At operating temperatures below 70° F., the capacity of low-temperature batteries also decreases but at a much slower rate; at 0° F., for example, 40 to 50 percent of the normal temperature capacity is still available while at —40° F. these batteries provide 10 to 20 percent of their normal capacity.

(3) *Reserve LeClanche batteries.* These batteries, after activation, perform like conventional batteries of this type ((1) *(a)* above).

(4) *RM cell batteries.* At operating temperatures above normal and up to 120° F., RM batteries have capacities equal to or slightly greater than their capacities at 70° F.; this is true regardless of load conditions or load schedules. At temperatures below normal, the capacity decreases; the rate of decrease is approximately the same as that for conventional LeClanche batteries ((1) *(a)* above). At —10° F. the capacity of an RM battery is practically zero.

(5) *Magnesium-silver-silver chloride batteries.* These batteries are stored in a desiccated state; therefore, exposure during storage to temperatures either higher or lower than 70° F. does not affect their performance. Exposure, after activation, to operating temperatures ranging from —40° F. to 120° F. has no appreciable effect on their capacities.

(6) *Zinc-silver chloride batteries.* Zinc-silver chloride batteries are presently used under conditions of light load of short duration (a few seconds) at irregular intervals. Under such conditions, the batteries are adversely affected by ambient temperatures both above and below 70° F. At temperatures above 70° F., the battery deteriorates. At temperatures below 70° F., the number of discharges decreases as the temperature drops to —40° F.; —40° F. is the lowest practical operating temperature.

11. Applications

a. PREPARATION FOR USE. (1) *Conventional and low-temperature LeClanche batteries.* These batteries may be used just as they are removed from the shipping carton or package; no special preparation for use is necessary.

(2) *RM batteries.* These batteries may be used just as they are removed from the shipping carton or package; no special preparation for use is necessary.

(3) *Magnesium-silver-silver chloride batteries.* To activate a magnesium-silver-silver chloride battery for use, proceed as follows:

(a) Remove the battery from its sealed container approximately 20 minutes before the battery is to be used.

(b) Immerse the battery into tap water (at temperature of 70° F. to 90° F.) for approximately 3 minutes.

(c) Remove the battery from the water at the end of the 3-minute immersion period, and allow it to soak for 5 minutes.

(d) Shake the battery free of all excess water.

(e) Place the battery into service immediately in order to apply the available electrical energy usefully. Once activated, these batteries become so active internally (both chemically and electrically) that the battery discharges or dissipates the available electrical energy within itself and becomes hot.

(4) *Reserve LeClanche batteries.* To activate a reserve-type battery, proceed as follows:

(a) Remove the battery from its container 24 hours before the battery is required for service.

(b) Fill the fluid receptacles with tap water.

(c) Allow the battery to stand, and then refill with tap water at 2- to 3-hour intervals until the battery will not soak up any more water.

(d) Stop up the fluid receptacles, and place the activated battery into service.

Caution: Before placing any battery into operation, always be sure that all terminals are clean and that all connections are properly made.

b. General Applications of Dry Batteries. The following list shows some typical applications of dry batteries to equipment. Refer to *SB 11-6, Dry Battery Supply Data,* for a complete listing of batteries and specific equipments with which used.

Battery	General application
BA-1	Buzzerphone, test set, telegraph sets, and flashlights.
BA-2	B supply for radio sets, test and maintenance sets, and telegraph sets.
BA-8	B supply for certain radio and sound ranging sets.
BA-9	Telephone EE-5 (obsolete).
BA-15-A	Radio sets, test sets, and test equipment.
BA-23	Radio sets, test sets, test and maintenance equipment, frequency meter sets, telephone central office sets, and Delta hand lantern.
BA-26	Radio receivers, sound ranging set, and telephone central office sets.
BA-27	Remote control sets and radio sets.
BA-28	Sound ranging sets, control boards, microphones, and volt-ohm-milliammeters.
BA-30	General purpose: radio and wire equipment, telephones, and flashlights.
BA-31	Test sets and test equipment.
BA-33	Test sets and radio sets.
BA-34	Test Set I-56-A.
BA-35	Radio sets, test sets, test equipment, and signal generator.
BA-36	Test sets and telephone repeaters.
BA-37	Radio sets SCR-536, and SCR-694-AW. Also used in Radio Set SCR-585 (obsolete).
BA-38	Radio Set SCR-536 and SCR-694-AW; Detector Set SCR-625. Also used in Radio Set SCR-585 (obsolete).
BA-39	Radio Sets SCR-509, SCR-510, SCR-609, and SCR-610 (transmitter); alinement indicator.
BA-40	Radio Sets SCR-509, SCR-510, SCR-609, SCR-610 (receiver); Telephone Repeater EE-89.
BA-41	Radio Sets SCR-509, SCR-510, SCR-609, and SCR-610 (bias).
BA-42	Test sets, test equipment, and radio sets.
BA-44	Trailer K-37.
BA-48	Radio Set SCR-694-C.
BA-49	Radio Set SCR-511.
BA-50	Lighting Unit ML-179
BA-51	Interphone amplifiers, maintenance equipment, public address systems, and radio equipment.
BA-53	Radio Sets, radio equipment, signal generators, and test equipment.
BA-56	Test Set I-61-A.
BA-58	Photographic Set PH-261.
BA-59	Test equipment and test sets.
BA-63	Radio Sets SCR-575 and SCR-645; oscillator test equipment.
BA-65	Radio Sets SCR-575 and SCR-645; test equipment.
BA-70	Radio Set SCR-300 and Maintenance Kit ME-53.
BA-200/U	Delta hand lantern.
BA-202/UF	Camera equipment and photographic equipment.
BA-203/U	Test Set TS-1/ARR-1 and Hallicrafter Model S-29.
BA-205/U	Radio sets.
BA-207/U	Portable searchlights.

c. Typical Dry Battery Applications for Ordnance Equipment.

Batteries used		Equipment
Quan.	Type	
2	BA-30*	Aiming post lights M14 and M43.
1	BA-30	Aiming post lights M41.
2	BA-34*	Firing switch T10.
(Varies)	BA-44	Generator trailer M7 and similar trailers with breakaway switches.
2	BA-23*	Helium charging kit for height finder.
2	BA-30*	Instrument lights M2, M10, M16, M19, M30, M33, M34, M35, M36, M39, M42, M45, M46, M47. Also used in the following: Instrument lights M9, M13, M17, M18, M20, M31, M32, which are obsolete.
1	BA-30	Instrument lights M1, M12, M22, M28, M37, and M38.
2	BA-30*	Lighting equipment assembly for elevation quadrant M1 on 8-inch gun carriage M2 and 240-mm Howitzer carriage M1.
2	BA-30*	Telescope mount M43.
1	BA-44	40-mm AA gun carriage M2 and M2A1.
1	BA-44	90-mm AA mount M1A1 and M2.
1	BA-44	120-mm AA mount M1.
1	BA-245/U	Blasting galvanometer.

d. Typical Dry Battery Applications for Corps of Engineers Equipment.

Batteries used		Equipment
Quan.	Type	
2	BA-30*	Baton, reflectorized, type I, flashlight, SNL No. 17-1360.500-500.
10	BA-30*	Box, sign, interior, illuminated electric, 4- x 15- inch message, SNL No. 17-1828.600-500.
2	BA-30*	Flashlight, hand, type I, 2-cell, SNL No. 17-4385.100-500 (part of reproduction set No. 1).
2	BA-30*	Glass, magnifying, self-illuminated, SNL No. 18-3926.380.500.
1	BA-200/U	Lamp, electric, debris patrol and rescue boat, SNL No. 17-6560.500.500 (part of floating pontoon bridge M-3).
2	BA-51*	Lamp, electric, flasher type, SNL No. 17-6560.500-500.
3	BA-23*	Lamp, electric, signal, SNL No. 17-6610.500.250, 2½ inches; SNL No. 17-6610.500.500, 5 inches (both now obsolete).
1	BA-200/U	Lantern, electric, portable, hand, dry-cell type, 6-volt, SNL No. 17-7012.-500.500.
3	BA-30*	Level, engineer's military, SNL No. 18-4542.350.500 (part of surveying equipment No. 10).
5	BA-30*	Light instrument set, industrial inspection, Ang-Lite Co. model F & L IAE, or equal, SNL No. 17-7045.100.-100 (part of maintenance equipment 870-09).
2	BA-42*	Octant, bubble type, illuminated, SNL No. 18-5045.500.500.
1	BA-9	Theodolite, direction, 1-second, SNL No. 18-8568.500.100.
		Transit, engineers', night illuminated, 20-second, SNL No. 18-8876.400.500.
2	BA-30*	K & E.
3	BA-30*	Gurley.

*Batteries are connected in series.

d. Typical Dry Battery Applications of Engineers Equipment (contd.)

Batteries used		Equipment
Quan.	Type	
		Transit, engineers', night illuminated, 1-minute, SNL No. 18-8876.400.200.
1	BA-30	K & E.
3	BA-30*	Gurley.
1	BA-207/U	Spotlight, electric, portable, hand pistol grip, dry battery, 9-volt, complete w/attachments, metal carrying case, and strap (used with fire-fighting equipment No. 486-18)

*Batteries are connected in series.

e. Classes of Dry Batteries in Accordance with Use. Batteries are grouped into the following four classes in accordance with use: A power batteries, B power batteries, C power batteries, and pack batteries. Batteries which do not fall within one of these classes are special-purpose batteries; their use is limited to the application for which they are designed.

(1) The A power batteries (fig. 24) are usually used to deliver higher currents at low voltages. These batteries are used to supply power for filament circuits in radio equipment, flashlights, lanterns, ignition boosters, and telephone A circuits.

(2) The B power batteries (fig. 25) are used to deliver small currents at high voltages. These batteries are used to supply plate current in radio and radar equipments and are also used as a high-voltage source for test sets.

(3) The C or bias batteries (fig. 26) are generally used to supply grid voltage in electronic circuits or to supply the power to operate the ohmmeter in test sets.

(4) The pack battery (fig. 27) incorporates more than one power supply into one battery. A pack battery usually incorporates an A and B source of power, but in some cases it may contain two B sources, a C source, and even another, such as a microphone battery.

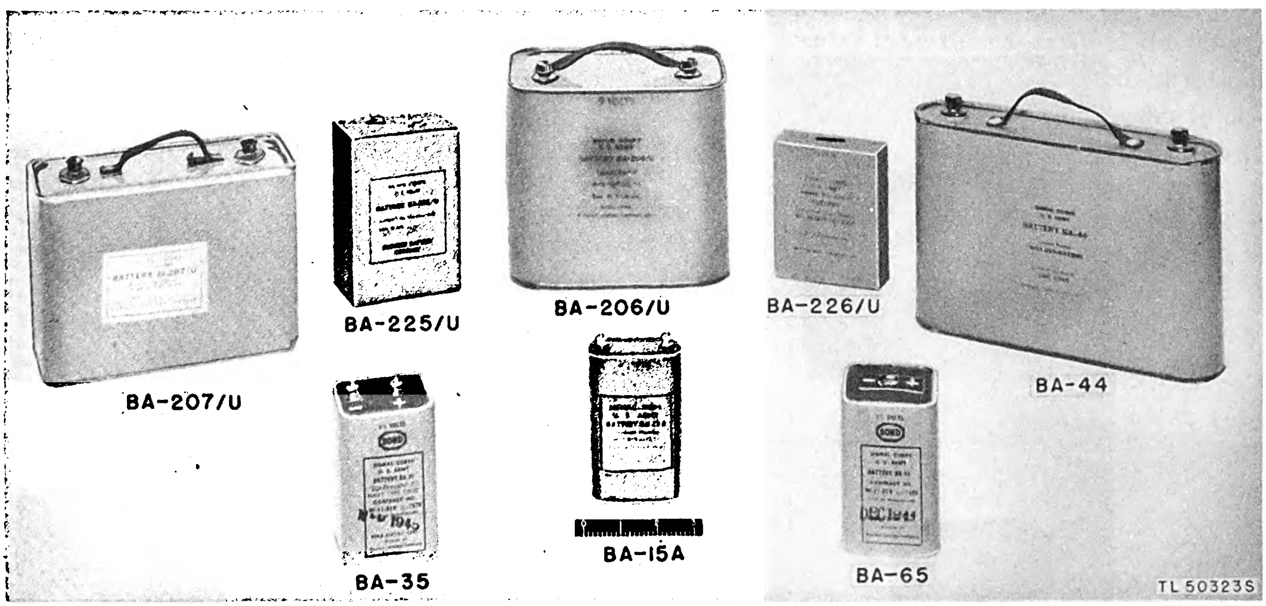

Figure 24. Typical A power batteries.

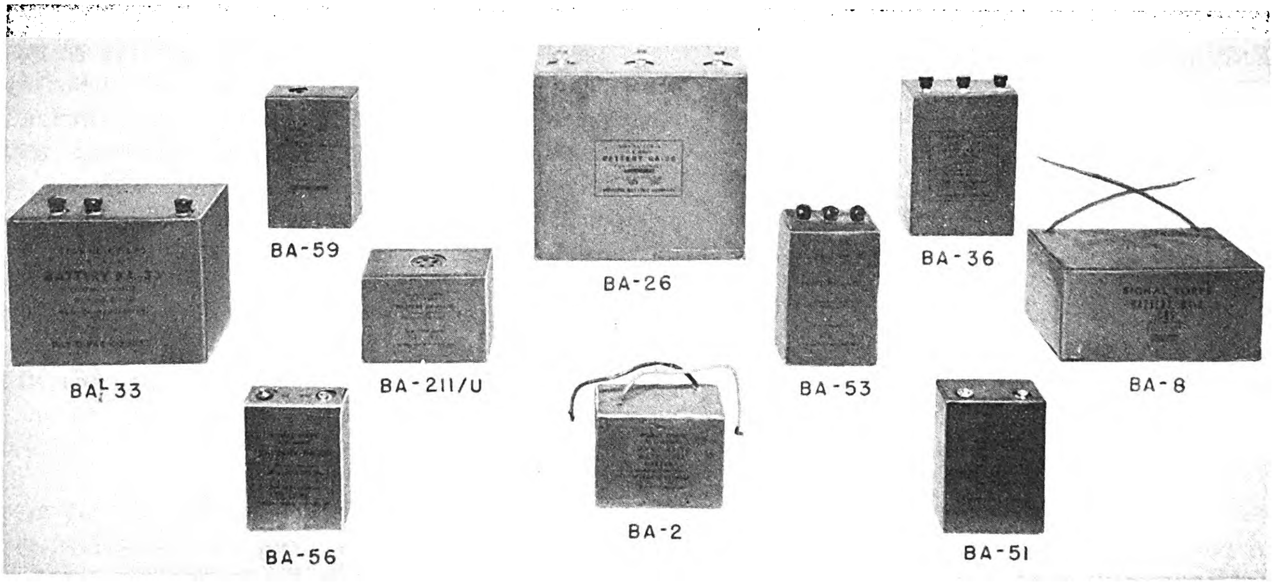

Figure 25. Typical B power batteries. TL93976

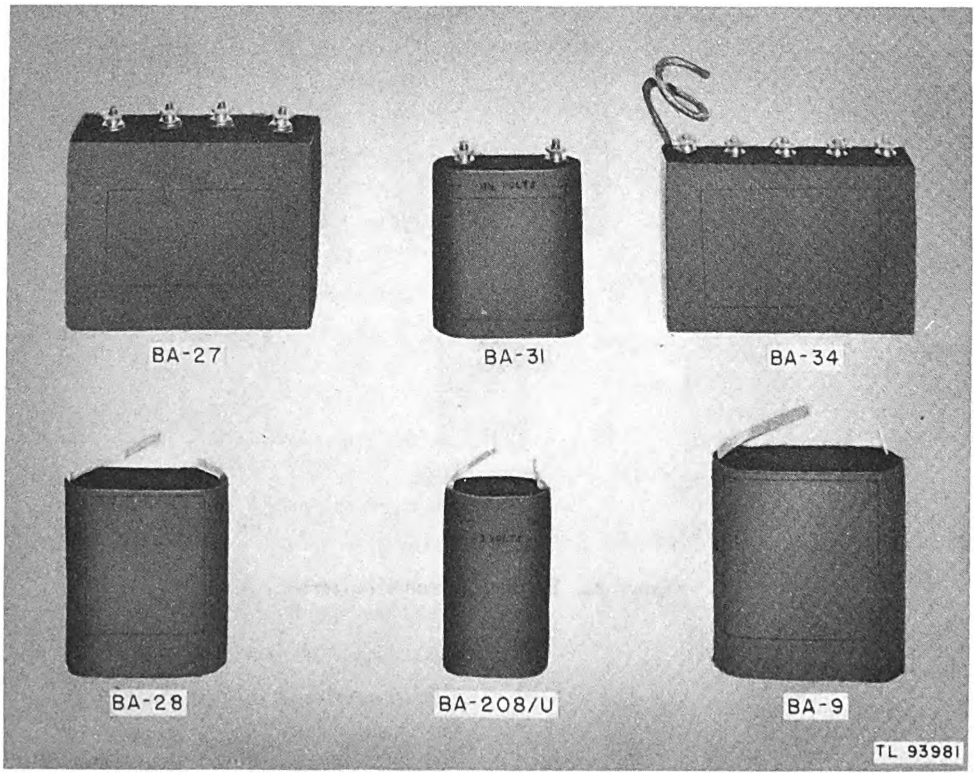

Figure 26. Typical C power batteries.

Figure 27. Typical pack batteries.

12. Battery Combinations and Connections

All LeClanche cells have a nominal voltage of 1.5 volts; their capacities, however, vary with use, design, and the amount of active materials in the cell. The physical size of a dry cell is an indication of its capacity. Thus in figure 28, the two batteries illustrated have the same voltage, but the capacity of the larger is 30 times greater than the capacity of the other. Cells or batteries may be connected in either series, parallel, or series-parallel in order to obtain the service and voltage necessary to meet the various power requirements.

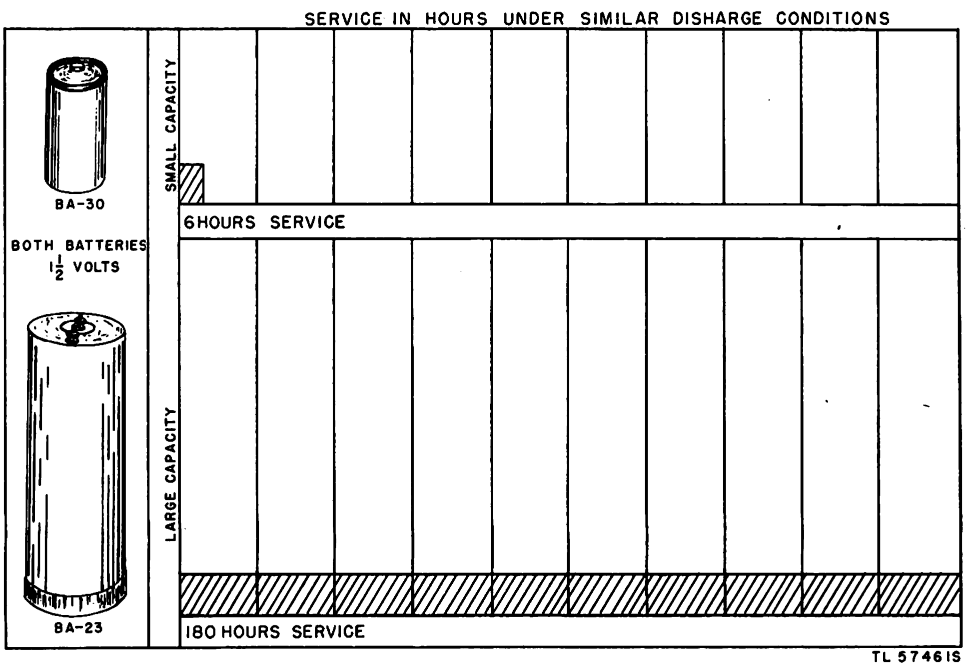

Figure 28. Comparative performance data.

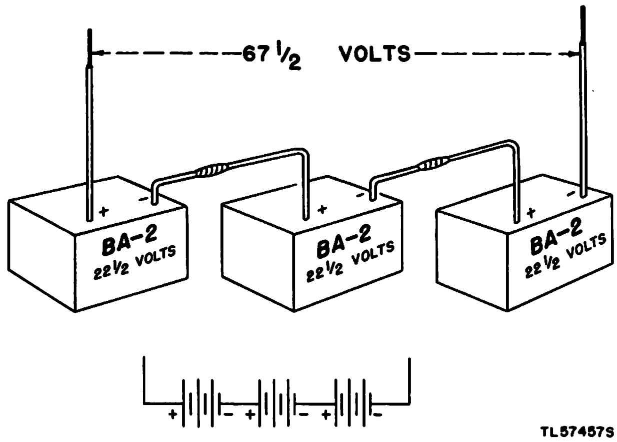

Figure 29. Series connections.

a. Series Connections. Cells or batteries may be connected in series by connecting the positive terminal of one to the negative terminal of the other (fig. 29). In series connections, voltage is additive, and the over-all voltage of the completed circuit is the sum of the voltage of each and every cell or battery connected in this manner. For example, if 90 volts is required for a certain application, it may be obtained by connecting four Batteries BA-2 (each Battery BA-2 is rated at 22½ volts) in series or by connecting two Batteries BA-36 (each Battery BA-36 is rated at 45 volts) in series. When series connections of cells or batteries are to be used, use similar sized cells or batteries composed of similar sized cells.

b. Parallel Connections. When greater capacity or current is required than can be obtained from a single cell or battery, arrange several cells or batteries in parallel by connecting the positive and negative terminals of one battery to the positive and negative terminals of the next battery, positive to positive and negative to negative (fig. 30). Connecting cells in parallel, in effect, divides the load or capacity requirements equally among the cells or batteries so arranged; the service obtainable from a parallel connection is therefore much greater than that obtainable from a single cell or battery. For example, for a service requirement of 1.0 ampere for a Battery BA-35, a usable life of 8½ hours can be expected; however, 22 hours of service can be obtained by connecting two Batteries BA-35 in parallel. When cells or batteries are connected in parallel to obtain increased capacity, the increase in capacity is generally at a greater ratio than the number of cells or batteries paralleled. Thus, in the example above, the increase in capacity is more than doubled. This ratio is true generally when cells of greater numbers than two are connected in parallel. Only batteries of similar voltages and capacity are connected in parallel. The total voltage of a group of batteries connected in parallel is the same as that of a single battery. The number of batteries that are connected in parallel for any given application is determined by the service required (fig. 30).

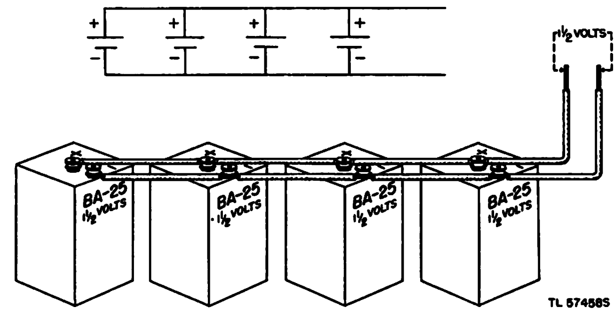

Figure 30. Parallel connections.

c. Series-Parallel Connections. Under certain conditions a single series or parallel connection of several cells or batteries may not give the desired service and voltage. A combination of the two types, called series-parallel connection, may be used. High voltage and high current capacity can be built up by parallel connections of series-connected cell or battery groups. The principal advantage of series-parallel connections of batteries is in the great number of available voltages and services. Fig-

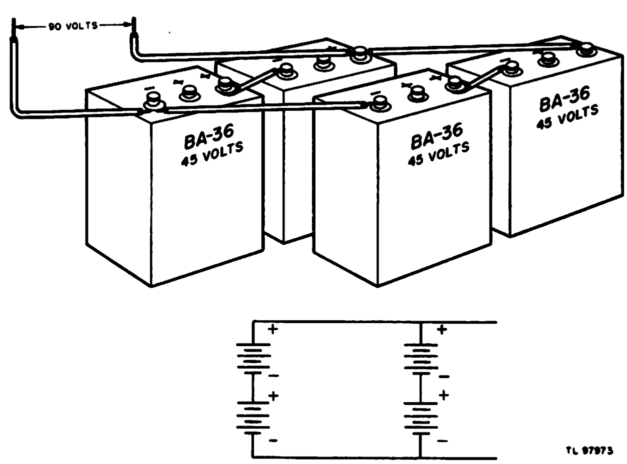

Figure 31. Series-parallel connections.

ure 31 illustrates two simple series-parallel connections; in each instance, the series-parallel combination has the voltage of two batteries in series and the capacity of two batteries in parallel.

13. Substitutions

a. Where the assigned battery or batteries for a specific equipment are not available, substitution is permissible. Where a substitute battery is used, the following factors must be considered when selecting the substitute:

(1) Voltages required.

(2) Minimum capacity or service required.

(3) Size of battery in reference to space available in equipment to house it.

(4) Type of terminals.

b. The following table lists three typical equipments, the batteries assigned, and the possible substitutions in the event that the assigned batteries are not available.

Equipment nomenclature	Assigned batteries		Possible substitutions			
			1st choice		2d choice	
	Type	Quan	Type	Quan	Type	Quan
Amplifier AM-32/ ( ).	BA-63	3*	BA-51	2*	BA-56	3*
	BA-203/U	1	BA-210/U	1	BA-205/U	2*
Radio Receiver and Transmitter BC-659.	BA-36	2*	BA-2	4*	BA-211/U	4*
Test Equipment TS-175 ( ) /U.	BA-2	6*	BA-33	1	BA-53	3*
	BA-23	4*	BA-35	4*	BA-15-A	4*

*Batteries are connected in series.

14. Low-Temperature Operations

The service obtained from a dry-cell battery decreases as the temperature of the battery decreases. The lowest operation temperature for batteries made up of either conventional LeClanche, reserve LeClanche, or RM type cells is approximately 0° F. Whenever low-temperature operation is required, use low-temperature LeClanche type batteries; these batteries operate to a temperature of —40° F. If low-temperature operation is required and low-temperature batteries are not available, heat the conventional, reserve, or RM battery which is to be used.

a. Whenever possible, keep batteries in a warm room for at least 24 hours prior to use at low temperatures.

b. After a battery has been apparently exhausted at low-temperature operation, it can often be reheated to obtain additional service.

c. The available low-temperature service of a battery can be often extended by placing the battery under the clothing near the body, by wrapping the battery with some insulating material, or by inclosing the battery in a wooden or cardboard box. Any device or procedure which helps retain the internal heat of the battery for a longer period of time increases the service of the battery.

d. Application of direct heat to a battery also helps to increase the low-temperature capacity. Extreme care must be taken not to apply too much heat; overheating the battery will melt some of the cell components and render the cell inoperable.

15. Precautions During Use

a. Always remove all batteries from any equipment prior to storage of the equipment. During the discharge of a dry-cell battery by deterioration, use, or accidental short circuit, the zinc container is attacked and holes are developed through which the electrolyte may penetrate the battery jacket and damage the equipment in which it is installed. The electrolyte that may leak out of an exhausted battery is corrosive and attacks most metals. This corrosive action is a prime cause of damage to battery-using equipments which have been stored with their batteries installed. The expansion or swelling of an exhausted battery also causes trouble in equipments which are stored with their batteries installed.

b. Be sure that RM cell batteries are completely exhausted before discarding them. RM cells have several times the capacity (par. 3*b*) of corresponding conventional LeClanche cell batteries. If this greater capacity is to be used advantageously, the RM cells must not be discarded before their capacity is exhausted. This is especially true where an RM battery is used as a substitute for a conventional LeClanche cell battery or where such a battery is being used in conjunction with a conventional LeClanche cell battery. Replace the conventional-type battery first, and attempt to operate the equipment before replacing the RM-type battery. When there is no doubt that the RM battery is exhausted, replace it and return the exhausted battery to the supply section for reclamation of the free mercury contained.

c. Each battery-using equipment has a definite battery complement assigned to it. Equipment operates best when the assigned batteries are used to power it. Always use the batteries assigned; make substitutions (par. 13) only as a field expedient.

SECTION III
STORAGE AND MAINTENANCE

16. Storage

a. GENERAL. The deterioration of all dry-cell batteries, except reserve LeClanche cells and magnesium-silver-silver chloride cell batteries, during storage or during standby when in service results from the spontaneous chemical action which goes on within the cells of the battery. Any condition which will slow down the chemical activity lessens the deterioration. Chemical activity is proportional to temperature (though not directly); in general, for every 10° C. drop in temperature, the chemical activity within the cell and the resultant deterioration will be halved. Conversely, every 10° C. increase in temperature doubles the chemical activity and accelerates deterioration.

b. DEPOT STORAGE. (1) *Selection of space.* Always store dry-cell batteries in space as cool and dry as practical. When possible, keep batteries (especially zinc-silver chloride types and LeClanche types designed for low-temperature operation or for smaller than size A cells) in a dry storage area, maintained at a constant temperature of 45° F., until requisitioned. Storage at 0° F. is better, but may not be economically practical in all cases. Where it is not possible to place all batteries in cold storage, select for such storage the low-temperature types and the batteries composed of A cells or smaller.

(2) *Ventilation.* Dry-cell batteries of conventional LeClanche types generate small quantities of hydrogen gas, particularly during the first few months after manufacture. To avoid the possibility of accumulating an explosive mixture of this gas, ventilate the storage space to insure at least one complete change of air per week. Storage space which does not contain any LeClanche type dry-cell batteries does not require such ventilations.

(3) *Provisions for periodic testing.* Depots should provide themselves with battery-testing facilities to enable depot personnel to conduct tests in accordance with SB 11–30. This is particularly true where storage includes batteries that have exceeded their shelf life.

(4) *Shipment and issue.* War Department Supply Bulletin SB 11–30 covers the shipment and issue of dry-cell batteries.

c. FIELD STORAGE. (1) *Section of space and cover.* In the field always store dry batteries in space as cool and dry as possible. Use the most effective protective cover available to keep the batteries dry and cool.

(2) *Ventilation.* Provide stock piles with aisles and air passageways to permit an adequate and free flow of air through the stock pile. Arrange the cover for the stock pile of batteries to permit adequate free air space above and around the stock pile.

(3) *Issue.* When batteries are issued for use, issue the oldest batteries first as determined by the date of manufacture stamped on the battery case.

(4) *Testing.* Test batteries as directed in SB 11–30, and use the test data given in table III of the supply bulletin.

17. Maintenance

a. GENERAL. Maintenance as applied to dry batteries refers largely to testing on specific occasions, in order to maintain depot stocks at a high level of reliability. Special conditions and problems involved in maintenance are encountered in nontemperate areas such as the Tropics, desert, and Arctic regions (*d* below).

b. MAINTENANCE AT DEPOTS. (1) *Original stock.* Original stock refers to batteries delivered from the manufacturer or from a depot of higher level. Such batteries, if stored under temperate conditions or stored as described in paragraph 16, require no maintenance until they begin to exceed their shelf life (see SB 11–30). Thereafter, test the batteries at 3-month intervals as long as they are retained in stock and just prior to shipment to another depot or to the field.

(2) *Stock returned from field.* Test all batteries which are returned from the field. Accept or reject the batteries for further storage at the depot as described both in paragraph 4 of section III and in table III of SB 11–30.

c. DISPOSITION OF DEFICIENT STOCK. Dispose (in accordance with directions given in section IV of SB 11–30) of stocks of dry batteries which have been rejected or determined to be unserviceable or exhausted.

d. MAINTENANCE IN NONTEMPERATE AREAS. Many dry battries are shipped in packings designed to overcome the destructive effects of climate and other unfavorable natural forces in nontemperate areas. The battery unit is wrapped in a sealed moistureproof and vaporproof barrier. All protruding terminals are protected by corrugated fiberboard pads. The packing case for shipping is a wooden container lined with waterproof paper securely sealed at all joints, seams, folds, and closures with water-resistant adhesive.

(1) *Wet Tropics maintenance.* (*a*) *Characteristics.* The wet Tropics are characterized by heavy rainfall, hot climate, and high humidity, Moisture is responsible for the chief maintenance problems in the wet Tropics. In these areas, dry-cell batteries may have an extremely short shelf life, a high percentage becoming unserviceable before use. This is particularly true of batteries containing smaller sized cells. Factors that cause the high rate of deterioration and the corrective measures are given in *b* below.

(*b*) *Preparation of batteries for storage.* Place dry-cell batteries in waterproof unit containers before they are placed in storage.

1. If the battery is received in the unit package described above, and if the package is undamaged, place the battery in storage in the original package. If the package is damaged, remove the batteries from the container and repack them in empty moistureproof barriers, carefully insulating the battery terminals. Seal barrier openings by heating them and then pressing them together. If moistureproof barriers are not available or are not in good condition, repack the batteries in tins or some other waterproof-moistureproof container. Be extremely careful not to heat the batteries during the sealing process, as excess heat may damage them.

2. If the batteries are received in inadequate packages that are not moistureproof, they must be repacked as described in *1* above.

3. If the methods of *1* and *2* above are not feasible, cover the batteries with a thick coating of nonconductive grease (water pump grease (WD), specification No. 2-109, can be used for this purpose). Be sure to clean the contacts of the batteries before use.

(2) *Desert maintenance.* (*a*) Desert climate is dry and the problem of moisture is almost nonexistent. High temperature is the main factor affecting the performance and life of batteries.

(*b*) Under conditions of high temperature and low humidity, shelf life of batteries is greatly reduced. Excessive desert temperatures increase the chemical activity of the batteries; as a result, higher capacities of batteries in good condition may be expected. The decrease in shelf life far outweighs any increase obtained by increased activity. Keep the batteries as cool as possible.

(*c*) Store dry-cell batteries in the coolest place possible. In desert regions, a waterproof-lined wooden case in a pit 4 feet deep makes a good storage place for dry-cell batteries. The temperature 4 feet below the desert surface is about 65° F. Take care to prevent water from getting into the bottom of the pit.

(3) *Arctic maintenance.* (*a*) In the Arctic, the only special precautions necessary are those which prevent the freezing of batteries. Moisture condensation can be expected, however, when cold equipment is brought into a warm enclosure.

(*b*) Very low temperatures greatly reduce the activity of dry cells. After exposure to low temperatures, cells recover their normal operating characteristics when the internal temperature returns to normal; usually no permanent damage is apparent. When batteries are exposed to the cold, there is considerable lag in the drop of their internal temperature. The effects of cold can be minimized by carefully insulating batteries with blankets or straw (par. 14).

SECTION IV
MISCELLANEOUS DATA

18. Requisitioning Data

Use the following procedures when requisitioning dry batteries:

a. Use *War Department Supply Bulletin SB 11–6, Dry Battery Supply Data,* to determine the quantities of batteries required for the operation under consideration. Avoid requisitioning more batteries than are needed.

b. The table of packaging data below lists the number of batteries supplied per unit package. Use this information when preparing requisitions. Requisition required batteries in multiples of the quantities shown per unit package.

c. Request rapid transport for all batteries required in oversea areas. Recommend air transport for all batteries which use small low-temperature LeClanche cells when required in oversea areas. The following batteries when required for oversea areas are recommended for air transport: BA–38, BA–41, BA–43, BA–49, BA–50, BA–51, BA–53, BA–56, BA–58, BA–63, BA–67, BA–221/U, BA–227/U, BA–228/U, BA–232/U, BA–233/U, BA–234/U, BA–237/U, BA–240/U, BA–241/U, BA–243/U, BA–245/U, BA–250/U, and all batteries of the BA–2000 series (such as BA–2030/U, BA–2070/U, etc.).

Packaging data

JAN Battery	Navy No.	Number of batteries per unit package	Arrangement within unit package
BA–1	....	12	4 x 3 x 1
BA–2	19033	6	2 x 3 x 1
BA–1002/U	....	6	2 x 3 x 1
BA–2002/U	....	6	2 x 3 x 1
BA–8	....	1	
BA–9	....	5	1 x 5 x 1
BA–15–A	....	8	2 x 4 x 1
BA–1015/A	....	8	2 x 4 x 1
BA–2015/A	....	8	2 x 4 x 1
BA–23	A	5	5 x 1 x 1
BA–26	19004A	1	
BA–2026/U	....	1	
BA–27	19014	8	2 x 4 x 1
BA–2027/U	....	8	2 x 4 x 1
BA–28	....	9	1 x 9 x 1
BA–1028/U	....	9	1 x 9 x 1
BA–2028/U	....	9	1 x 9 x 1
BA–30	C	25	5 x 5 x 1
BA–2030/U	....	25	5 x 5 x 1
BA–31	19013	5	1 x 5 x 1
BA–2031/U	....	5	1 x 5 x 1
BA–33	....	1	
BA–1033/U	....	1	
BA–2033/U	....	1	
BA–34	19011	4	1 x 4 x 1
BA–2034/U	....	4	1 x 4 x 1
BA–35	19010	4	2 x 2 x 1
BA–1035/U	....	4	2 x 2 x 1
BA–2035/U	....	4	2 x 2 x 1
BA–36	19005	3	1 x 3 x 1
BA–1036/U	19005-RM	3	1 x 3 x 1
BA–37	19037	12	4 x 3 x 1
BA–1037/U	....	12	4 x 3 x 1
BA–38	19038	12	4 x 3 x 1
BA–1038/U	19038-RM	12	4 x 3 x 1
BA–2038/U	....	12	4 x 3 x 1
BA–39	....	1	
BA–1039/U	....	1	
BA–2039/U	....	1	
BA–40	....	1	
BA–1040/U	....	1	
BA–2040/U	....	1	
BA–41	....	1	
BA–42	....	25	5 x 5 x 1
BA–43	....	1	
BA–1043/U	....	1	
BA–44	....	1	
BA–45	....	10	1 x 1 x 10
BA–48	....	1	
BA–1048/U	....	1	
BA–2048/U	....	1	
BA–49	....	1	
BA–1049/U	....	1	
BA–50	....	18	2 x 9 x 1
BA–51	19032	5	1 x 5 x 1
BA–53	....	1	
BA–1053/U	....	1	
BA–2053/U	....	1	
BA–56	....	5	1 x 5 x 1
BA–58	....	12	6 x 2 x 1
BA–2058/U	....	12	6 x 2 x 1
BA–59	19021	1	
BA–1059/U	....	1	
BA–63	....	3	1 x 3 x 1
BA–1063/U	....	3	1 x 3 x 1
BA–2063/U	....	3	1 x 3 x 1
BA–65	....	5	5 x 1 x 1
BA–2065/U	....	5	5 x 1 x 1
BA–67	19028	4	1 x 4 x 1
BA–70	....	1	
BA–2070/U	....	1	
BA–1080/U	....	1	
BA–200/U	....	5	5 x 1 x 1
BA–2200/U	....	5	5 x 1 x 1
BA–202/UF	....	25	5 x 5 x 1
BA–203/U	19020	1	
BA–1203/U	....	1	
BA–2203/U	....	1	
BA–204/U	....	8	2 x 4 x 1
BA–2204/U	....	8	2 x 4 x 1
BA–205/U	....	5	1 x 5 x 1
BA–2205/U	....	5	1 x 5 x 1
BA–206/U	....	1	
BA–207/U	6F4	1	
BA–208/U	....	18	3 x 6 x 1
BA–1208/U	....	18	3 x 6 x 1
BA–209/U	....	15	5 x 3 x 1
BA–210/U	....	3	3 x 1 x 1
BA–1210/U	....	3	3 x 1 x 1

Packaging data—(continued)

JAN Battery	Navy No.	Number of batteries per unit package	Arrangement within unit package
BA-2210/U	....	3	3 x 1 x 1
BA-211/U	....	3	1 x 3 x 1
BA-1211/U	....	3	1 x 3 x 1
BA-212/U	....	1	
BA-216/U	19016	1	2 x 3 x 1
BA-218/U	19183	1	
BA-220/U	19015	1	
BA-221/U	19027	1	
BA-222/U	19043	1	
BA-1222/U	....	1	
BA-2222/U	19043	1	
BA-223/U	....	1	
BA-2223/U	....	1	
BA-225/U	....	1	
BA-2225/U	....	1	
BA-226/U	....	5	1 x 5 x 1
BA-227/U	....	6	3 x 2 x 1
BA-228/U	....	3	1 x 3 x 1
BA-1228/U	....	3	1 x 3 x 1
BA-230/U	....	3	1 x 3 x 1
BA-2230/U	....	3	1 x 3 x 1
BA-231/U	....	15	5 x 3 x 1
BA-1231/U	....	15	5 x 3 x 1
BA-232/U	....	6	2 x 3 x 1
BA-1232/U	....	6	2 x 3 x 1
BA-2232/U	....	6	2 x 3 x 1
BA-233/U	....	6	2 x 3 x 1
BA-1233/U	....	6	2 x 3 x 1
BA-234/U	....	6	2 x 3 x 1
BA-1234/U	....	6	2 x 3 x 1
BA-2234/U	....	6	2 x 3 x 1
BA-235/U	B-3, model 1	1	
BA-236/U	B-4, model 1	1	
BA-237/U	B-14	1	
BA-238/U	B-15	1	
BA-239/U	B-17	1	
BA-241/U	B-21	1	
BA-242/U	K-4	1	
BA-243/U	B-24	1	
BA-244/U	....	1	
BA-1246/U	....	5	1 x 5 x 1
BA-1247/U	....	1	
BA-248/U	B-25	1	
BA-249/U	B-6	1	
BA-250/U	B-19	1	
BA-251/U	B-28, model 0	10	2 x 5 x 1

19. Unsatisfactory Equipment Report

a. WD AGO FORM 468 (WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT) FOR EQUIPMENT USED BY ARMY GROUND FORCES AND TECHNICAL SERVICES. WD AGO Form 468 will be filled out and forwarded through channels to the Office of the Chief Signal Officer, Washington 25, D. C., when trouble occurs more often than is normal, as determined by qualified repair personnel.

b. AAF FORM 54 (UNSATISFACTORY REPORT) FOR EQUIPMENT USED BY UNITED STATES AIR FORCES. AAF Form 54 will be filled out and forwarded to Commanding General, Air Matériel Command, Wright Field, Dayton, Ohio, in accordance with AAF Regulation 15–54.

c. MISCELLANEOUS. When filling out an unsatisfactory equipment report for a battery, identify the battery by showing the type number, the manufacturer, date of manufacture, order, and contract number. Include any peculiarities and other pertinent data pertaining to the failure, such as the following: preparation and activation procedures, ambient conditions prevailing at time of operation, nature of the failure observed, load on the battery, cut-off voltages, equipment operating schedule. Include operator's recommendations for overcoming the failure.

20. Specifications

a. JOINT ARMY-NAVY SPECIFICATIONS.

JAN–B–18 Batteries, Dry.

b. SIGNAL CORPS SPECIFICATIONS.

70–352 Battery BA–252/U.
70–353 Battery BA–253/U.
70–345 Battery BA–245/U (Lead Acid).
70–400 Batteries, Storage (Portable).
270–66 Battery BA–229/CRN.

21. Technical Manuals

TM 11–462 Signal Corps Reference Data.
TM 11–430 Storage Batteries for Signal Communication Except Those Pertaining to Aircraft.

22. Supply Bulletins

SB 11–6 Dry Battery Supply Data.
SB 11–30 Shipment and Shelf Life Information, Testing, and Disposition of Dry Batteries.
SB 11–110 Change in Army-Navy Nomenclature for Dry Batteries.

23. Forms

WD AGO Form 468 (Unsatisfactory Equipment Report).
AAF Form 54 (Unsatisfactory Report).

24. Abbreviations

AgCl silver chloride
C centigrade
cu in. cubic inch

cyc	cycle	mo	month
disch	discharge	NaCl	sodium chloride
F	Fahrenheit	quan	quantity
hr	hour	RM	Rubin-Mallory
JAN	Joint Army-Navy	SB	supply bulletin
KOH	potassium hydroxide	v	volt
ma	milliampere	vol	volume
max	maximum	wk	week
Mg-Ag-AgCl	magnesium-silver-silver chloride	wt	weight
min	minute	Zn	zinc

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