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**TECHNICAL BULLETIN**

**TECHNICAL DATA, SERVICEABILITY  
TESTING AND PRESERVATION AND  
PACKAGING FOR BATTERIES, WET PRIMARY  
BA-472/U, BA-472C/U, BA-472D/U, BA-472E/U,  
(NSN 6135-00-823-3034); BA-485A/U and  
BA-485B/U (NSN 6135-00-837-5331); BA-486A/U,  
BA-486B/U, (NSN 6135-00-889-1502); BA-487/U  
(NSN 6135-00-876-0098); AND DRY THERMAL  
B-415 (NSN 6135-00-655-2279);  
BA-605/U (NSN 6135-00-546-6273); BA-617/U  
(NSN 6135-00-767-0331); BA-618/U  
(NSN-6135-00-603-4859); BA-627/U  
(NSN 6135-00-999-9141); BA-628/U  
(NSN 6135-00-930-1570); BA-629/U  
(NSN 6135-00-255-1340)  
BA-630/U (NSN 6135-00-237-1703)**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY  
8 MARCH 1984**

Technical Bulletin )  
 )  
 No. 11-6135-200-25 ) }

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 Washington, DC, 8 March 1984

**TECHNICAL DATA, SERVICEABILITY TESTING AND PRESERVATION AND PACKAGING  
 FOR BATTERIES, WET PRIMARY BA-472/U, BA-472C/U, BA-472D/U, BA-472E/U  
 (NSN 6135-00-823-3034); BA-485A/U and BA-485B/U (NSN 6135-00-837-5331); BA-486A/U,  
 BA-486B/U (NSN 6135-00-889-1502); BA-487/U (NSN 6135-00-876-0098); AND DRY THERMAL  
 B-415 (NSN 6135-00655-2279); BA-605/U (NSN 6135-00-5466273); BA-617/U (NSN 6135-00-767-0331);  
 BA618/U (NSN 6135046034859); BA627/U (NSN 61350-999-9141); BA-628/U (NSN 6135009301570);  
 BA-629/U (NSN 6135-00-255-1340); BA-630/U (NSN 6135-00-237-1703)**

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSELME.MP, Fort Monmouth, New Jersey 07703.

In either case a reply will be furnished direct to you.

\*This bulletin supersedes TB 11-6135-200-25-1, 10 December 1976.

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## SECTION I INTRODUCTION

### 1-1. Scope.

This bulletin provides technical data and serviceability test procedures for batteries used in the NIKE-HERCULES and Pershing missile systems. It also includes shelf and service life figures for the batteries and disposition instructions for unserviceable and overaged batteries. This bulletin covers Batteries, Wet Primary BA-472C/U, BA-472D/U, BA-472E/U, BA-485A/U, BA-485B/U, BA-486A/U, BA-486B/U, and BA-487/U; and Dry Thermal B-415, BA-605/U, BA-617/U, BA618/U, BA-627/U, BA-628/U, BA-629/U, and BA-630/U.

### 1-2. Consolidated Index of Army Publications and Blank Forms.

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

### 1-3. Maintenance Forms, Records, and Reports.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be

those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-54/MCO 4430.3F.

c. Discrepancy in Shipment Report (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

### 1-4. Reporting Equipment Improvement Recommendations (EIR)

If your batteries need improvement, let us know. Send us and EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

## SECTION II. TECHNICAL DATA AND SERVICE LIFE

### 2-1. Description of Batteries

a. The chart below lists the batteries covered in this bulletin with their voltage ratings, dimensions and

weights. The batteries are shown in figures 2-1, 2-2 and 2-3.

Battery Type	National Stock No	Voltage rating	Dimensions (inches)	Wt. (lb.)
Battery, Wet Primary BA-472C/U; BA-472D/U; BA-472B/U	6135-00-823-3034	28	4.1 x 6.34 x 6.356	11
Battery, Wet Primary BA-485A/U; BA-485B/U	6135-00-837-5331	28	9 x 14.25 x 18.75	48
Battery, Wet Primary BA-486A/U; BA-486B/U	6135-00-889-1502	26-32	7.5 x3.25 x 11.5	43
Battery, Wet Primary BA-487/U	6135-00-876-0098	25-32	10.5 x 11.75 x 11	55

a. Batteries, Wet Primary BA-472C/U, BA-472D/U, BA-472E/U and BA485A/U, BA-485B/U, BA-486A/U, BA-486B/U and BA-487/U are special purpose zinc/silver oxide batteries. These batteries are contained in hermetically sealed stainless steel cases. The potassium hydroxide (KOH) electrolyte is stored in a sealed reservoir within the battery case. To activate the battery, an electrical impulse is applied to a squib which ignites a gas generator. The gas pressure generated breaks the seal in the reservoir and forces the electrolyte into the cells very rapidly,

activating the battery. This is normally accomplished just before the missile is fired.

c. The BA472(\*)/U and BA485(\*)/U are used in the NIKE-HERCULES missile. The BA472(\*)/U powers the guidance electronics and the BA485(\*)/U powers the hydraulic control system. While the missile system is in the "ready" condition, the batteries are kept heated to about 115 °F by thermostat controlled heaters in the battery. The thermostats control the temperature and also operate monitor systems which will give a warning if the

temperature is not correct or if the heaters fail. If a failure is indicated, the battery should be removed from the missile and returned to direct support for testing.

d. The BA-486A/U and BA-486B/U are used in the Pershing missile, providing power to the guidance section. These are two-section batteries. These batteries are placed on heat only during the count-down before the missile is fired, and far enough ahead of the firing to allow the batteries to come up to heat.

**2-2. Test Equipment Required**

The test equipment required for the testing of the various batteries is listed in table 2-1.

**CAUTION**

If Multimeter AN/USM-223 is not available, Multimeter TS-352B/U may be used instead, except that the TS-352B/U may not be used to check the resistance of the electric matches in the batteries. The TS-352B/U ohmmeter circuits output a high operating current in the T6w-resistance ranges in these tests. The high current will damage the matches. If the AN/USM-223 is not available for the match test, use an ohmmeter with a low current output such as Test Set, Arming Mechanism (8020264) for the test.

**2-3. Shelf and Service Life**

a. Batteries BA-472C/U, BA-472D/U, BA-485A/U and BA-485B/U, used in the NIKE-HERCULES missile, are kept on heat all of the time the battery is installed in the missile. The ages of these batteries are therefore defined as their shelf and service life. The age of a battery having only pure shelf life is equal to its actual age. The age of a battery on missile heat is effectively greater than its actual age. The shelf and service life of the battery can be determined from the manufacturing data on the nameplate and from the battery history record card which should be kept on each battery. The record card must be kept up to date and accurate to determine the true effectiveness of the battery. If no card is available with the battery when it is received, one may be made up using the following format:

TYPE OF BATTERY \_\_\_\_\_  
 MANUFACTURER \_\_\_\_\_  
 CONTRACT NO. \_\_\_\_\_  
 DATE OF MANUFACTURE \_\_\_\_\_  
 SERIAL NUMBER \_\_\_\_\_  
 DATE INSTALLED IN MISSILE \_\_\_\_\_  
 DATE REMOVED FROM MISSILE \_\_\_\_\_  
 AVERAGE AMBIENT TEMPERATURE DURING  
 INSTALLATION PERIOD \_\_\_\_\_  
 AVERAGE AMBIENT TEMPERATURE DURING  
 STORAGE \_\_\_\_\_  
 DATE RECEIVED FROM USING  
 ORGANIZATION \_\_\_\_\_  
 SERVICEABILITY TEST DATE  
 AND RESULT \_\_\_\_\_  
 NAME OF TECHNICIAN WHO PERFORMED  
 SERVICEABILITY TEST \_\_\_\_\_

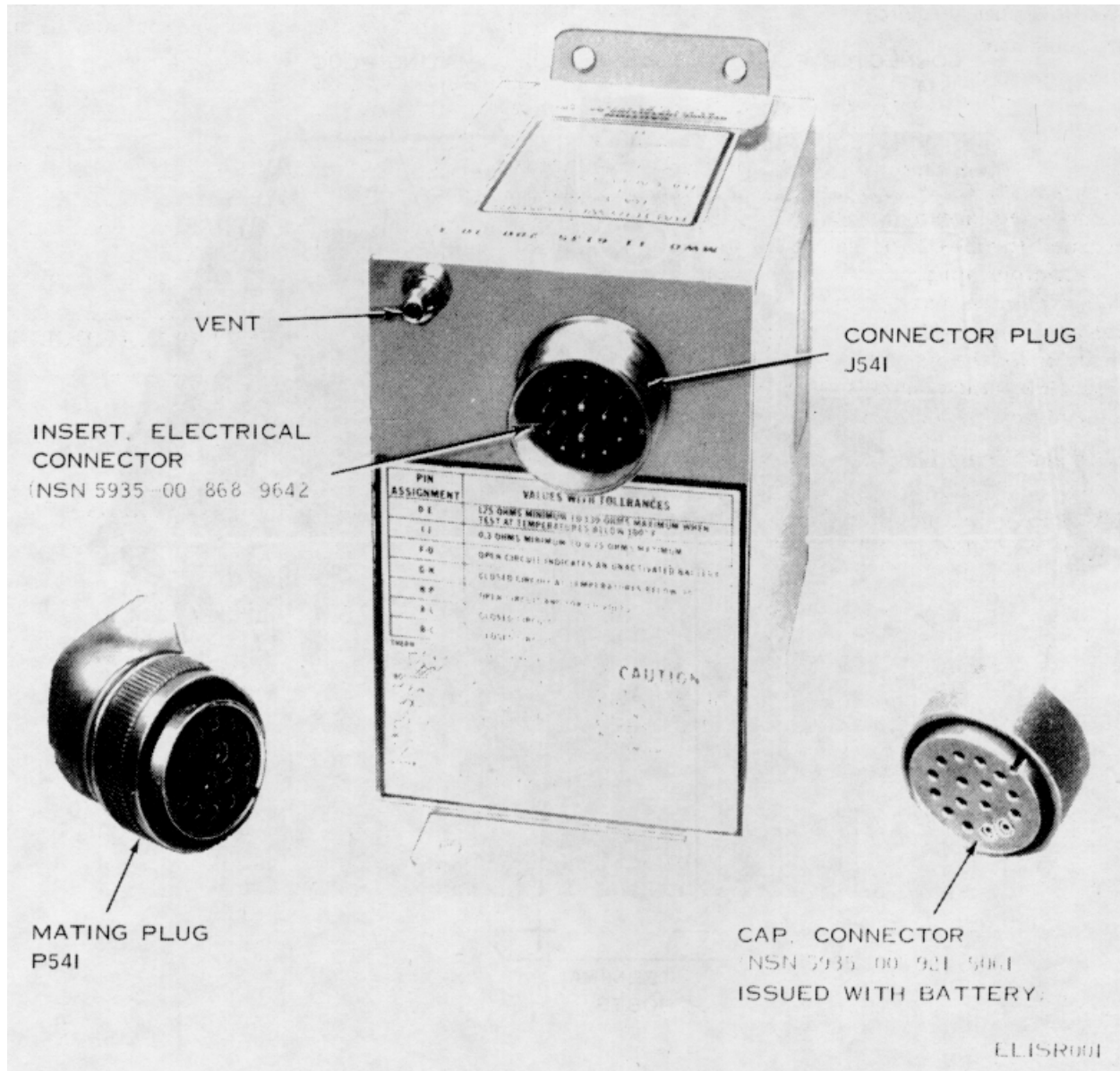


Figure 2-1. Battery, Wet Primary BA-472C/U for BA 472D/U.

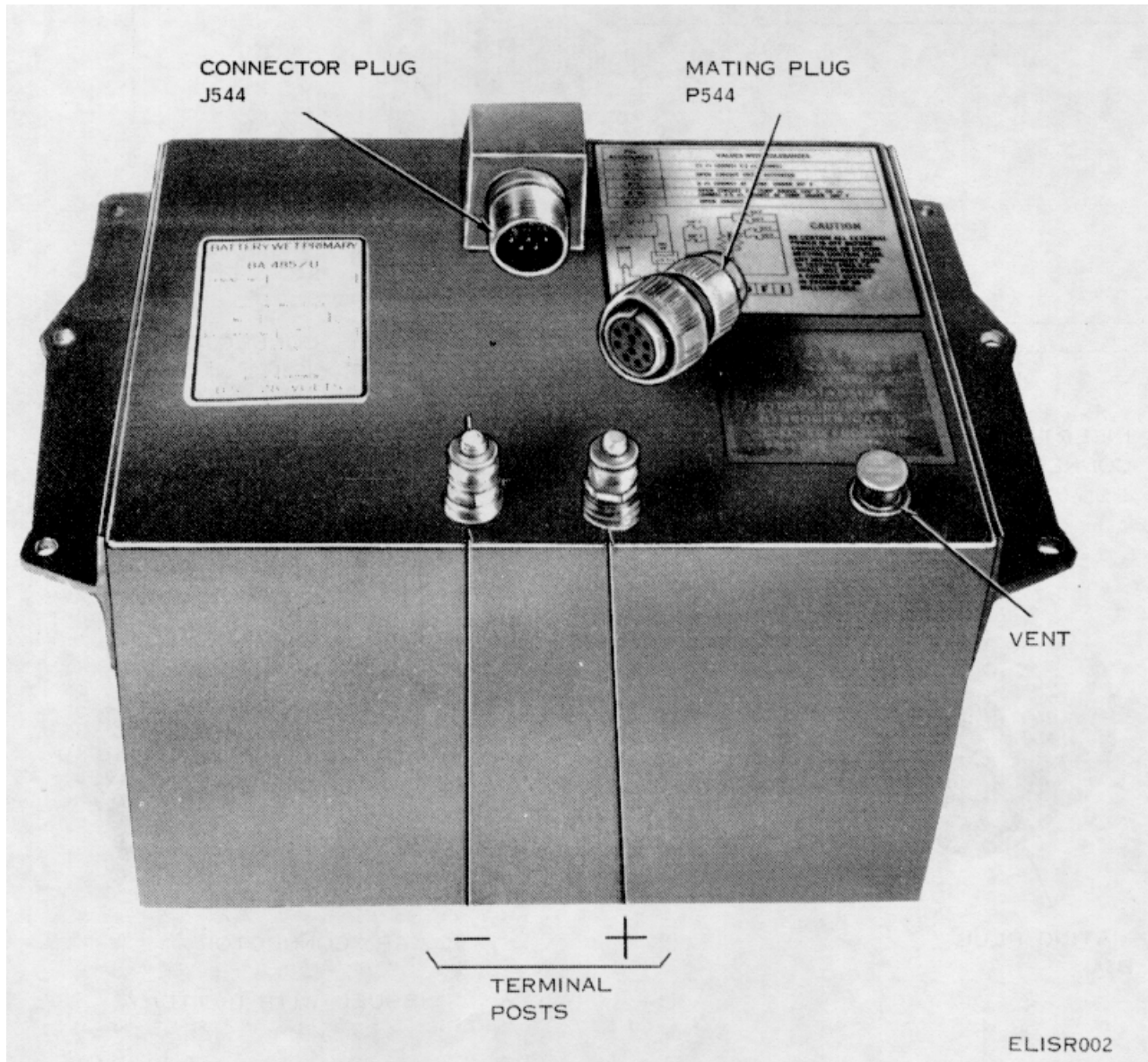


Figure 2-2. Battery, Wet Primary BA-485A/U or BA-485B/U.

Table 2-1. Test Equipment Required

Quantity	Nomenclature	NSN	Shelf Life Yrs.	Remaining Service Life Yrs.	Months
1	Multimeter, AN/USM-223	6625-00-999-7465	4	15	0
1	Ammeter ME-65A/U	6625-00-985-5251	5	14	6
1	Thermometer, self-indicating, liquid in glass	6685-00-498-2625	6	14	0
1	Battery, Dry BA-200/U (6 volt)	6135-00-050-3280	7	13	6
1	Battery, Dry BA-305/U (30 volt)	6135-00-112-8637	8	13	0
			9	12	3
			10	11	4
			11	10	6
			12	9	9
			13	9	2
			14	8	5
			15	7	8
			16	7	0
			17	6	2
			18	5	5
			19	4	9
			20	4	2
			21	3	6
			22	3	0
			23	2	6
			24	2	0
			25	1	6
			26	1	0
			27	0	6
			28	0	0

b. For the BA-472C/U and BA-472D/U, the allowable pure shelf life is set at 28 years. The allowable pure service life is set at 17 years. The following chart shows the maximum allowable combination of shelf and service life for the batteries:

Combined Shelf/Service Life Table for BA -472/U Battery

Shelf Life Yrs	Remaining Service Life Yrs	Months
0	17	5
1	16	8
2	16	0
3	15	6



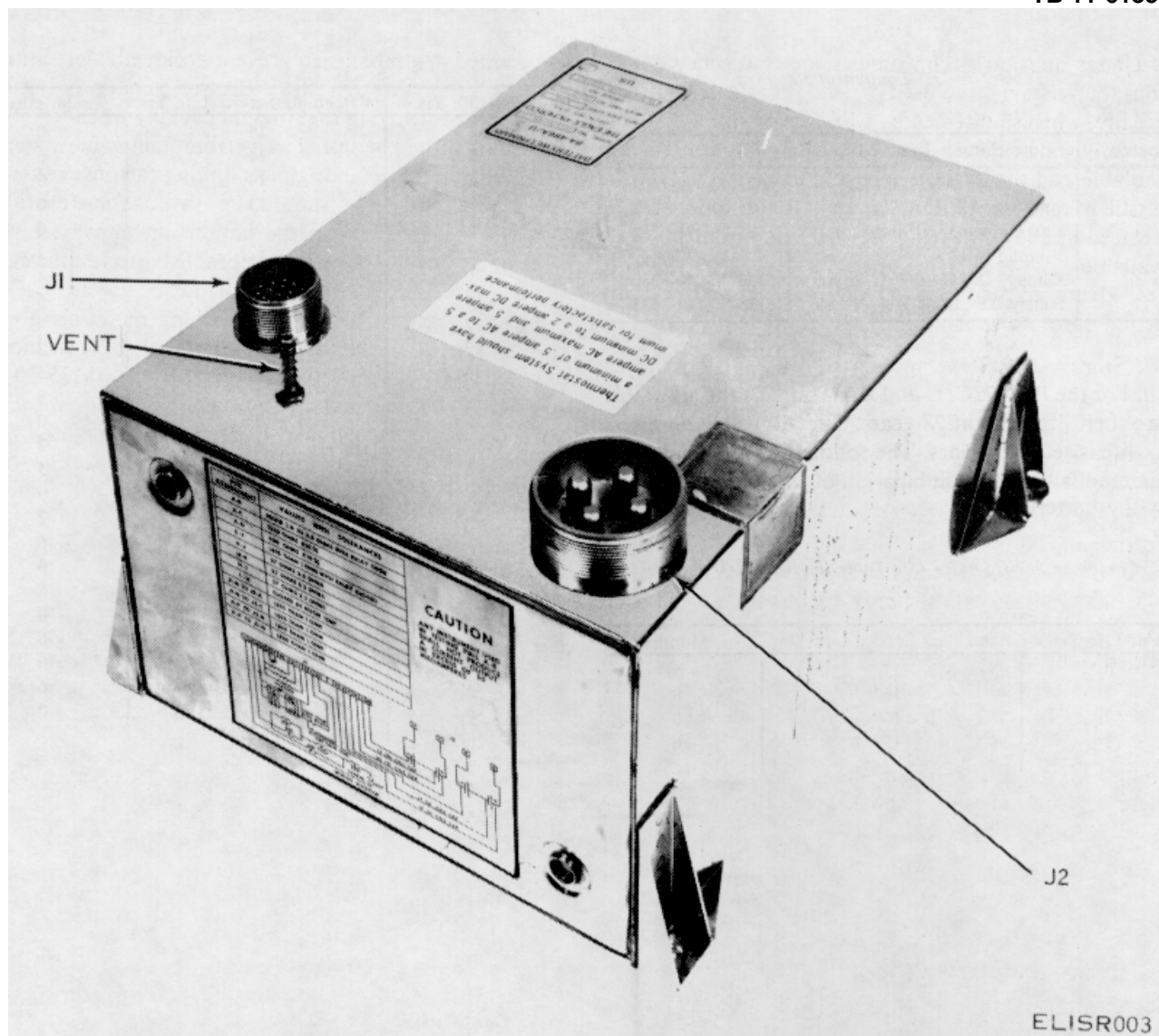


Figure 2-3. Battery. 1 et Primary BA-486A/U or BA-486B/U.

c. To use the above chart, examine the battery card and determine how long the battery was stored between the date of manufacture and the date of installation in a missile. This is the expended shelf life of the battery. Locate the shelf life in the shelf life column. The figure adjacent to it in the service life column is the amount of service life remaining for the battery. If the battery was subsequently removed from the missile, subtract the time it was in the missile (expended service life) from the starting service life (as determined above) to determine the remaining service life. Find the expended shelf life adjacent to the remaining service life in the chart.

d. Shelf/service life for the BA-485A/U and BA-485B/U are established at 12 years, for any combination of shelf and service life. This is determined by the difference between the date of manufacture and the current date.

e. The BA-486A/U and BA-486B/U are not maintained on missile heat until just prior to firing, therefore, no distinction is made between shelf life and service life. Total allowable life for these batteries is indefinite, but at least 15 years.

#### 2-4. Reporting of Overaged Batteries

a. Batteries that have passed their allowable shelf or service life should be reported on Standard Form 120, Report of Excess Personal Property. A copy of the battery record card should be attached and both forwarded to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-MEMP, Fort Monmouth, NJ 07703. Disposition instructions will be returned specifying where to send the batteries and the method of shipment. Under no circumstances should the batteries be disposed of without written instructions from CECOM.

b. Under unusual circumstances, or emergency conditions, batteries may be used beyond the stated shelf/service life, when so directed by CECOM or MICOM. This normally will be done when replacement batteries are not available and the batteries are required to maintain the missile in ready condition. These batteries must then be replaced as soon as the replacement batteries are made available.

c. Overaged batteries do not require serviceability testing before disposition.

## 2-5. Storage and Shipping

a. *Storage.* Batteries that are to be stored for any period of time should be kept indoors, protected from the weather and stored at a cool temperature, preferably between 50° and 70° F. Be certain the connector cap NSN 5935-00-921-5061 (for BA-472C/U or BA-472D/U), or mating plug NSN 5935-00-539-2230 (BA-485A/U or BA485B/U) are in place, and insure mating connector NSN 5935-00-539-2230, P544 pins C & E are shorted (BA485/U). These batteries should never be stored or shipped without the protective cap or plug in place. If none are available, wrap heavy aluminum foil and pack it into the connector cavity so that the connector pins are shorted out. (Pins I and J for the BA-472C/U and BA-472D/U, and pins C and E for the BA-485A/U and BA-485B/U), these pins must always be shorted when the battery is not TB 11-6135-200-25 installed in a missile,

to prevent accidental activation of the battery through stray electrical charges. Batteries should be stored in the original packing whenever possible and should be stored away from flammable materials.

b. *Shipping.* The original shipping cartons, crates and packing materials should be saved for future use whenever possible when the batteries are unpacked. When replacing overaged or unserviceable batteries, the carton and crate from the new battery may be used to pack the old battery. If the original packing materials are not available, pack the battery with 1-inch thick cushioning material, specification PPP-C-1120 (NSN 8135-00-2929789) around the sides, ends, top and bottom of the battery. Pack the cushioned battery in a corrugated fiberboard box. Overpack the box in a wooded packing crate, cushioning all sides with cellulosic cushioning material, specification PP-C-843 (NSN 8135-00-183-8823) to make a tight pack. The battery may then be shipped by best available transport.

### NOTE

**Upon receipt and installation of the new batteries BA-472/U and BA485/U, the protective cap NSN 5935-00-921-5061) or mating plug (NSN 5935-00539-2230) shall be mated to the old batteries being returned.**

## SECTION III SERVICEABILITY TESTS

### 3-1. Temperature Test Chamber

Serviceability testing of the BA-472C/U, BA-472D/U, BA-485A/U and BA-485B/U involves testing the heater blanket and thermostats within the battery. Accurate measurements must be made of the temperatures at which the thermostats operate to turn the heaters on and off. This test requires the use of a controlled temperature chamber and an accurate thermometer or other heatsensing device. An acceptable insulated chamber may be fabricated from a cardboard carton and the horsehair packing material that came with the battery. Use masking tape to hold the pieces together and to hold the thermometer in place. The fabrication of a chamber for the BA-472C/U or BA-472D/U is shown in figure 3-1. A similar chamber may be fabricated for the BA-485A/U or BA-485B/U, using the packing materials supplied with those batteries. For best heat sensing, be certain that the thermometer comes in direct contact with the battery case.

### 3-2. Serviceability Tests for Battery, Wet Primary BA-472C/U, BA-472D/U and BA-472E/U

When a Battery, Wet Primary BA-472C/U, BA-472D/U, or BA-472E/U which is not overaged, is turned in to direct support maintenance for testing, it must be tested by the procedure in a through s below to determine whether the battery is serviceable or unserviceable. Serviceable batteries can be reinstalled or turned over to

the inventory manager for reissue. If any of the conditions are not met, the battery must be considered as unserviceable. For disposition of unserviceable batteries, refer to paragraph 3-4. Serviceability tests should be run on all new or off-the-shelf batteries before they are installed in missiles, on all batteries in missiles during regular missile teardown, and on all batteries turned in for any reason, if they have not exceeded their shelf/service life. Inventory stock does not require testing until time of actual use.

### CAUTION

**If the TS-352B/U is used in the following procedure instead of the AN/USM-223, be extremely careful in making resistance measurements. The electric match in the battery can be damaged or destroyed if the ohmmeter leads are placed across pins I and J.**

### NOTE

**Perform the following tests only in the order given. Do not vary the sequence or attempt to perform any part of the test out of sequence or independently of the procedure.**

**Error! Not a valid filename.***Figure 3-1. Insulated Test Chamber for Testing BA-472C/U or BA-472D/U.*

- a. Mount the protective connector cap (NSN 5935-00-921-5061) on connector jack J541.
- b. Set the AN/USM-223 to the 50-volt dc range and measure the voltage between pins N and P. The potential measured must be 0 volt.
- c. Using the AN/USM-223 as an ohmmeter, on the R x 10,000 range, test for resistance between the battery case and the exposed pins (A through H, L, N, O and P). The resistance measured must be greater than 1 megohm.
- d. Remove the protective cap from J541. With the AN/USM-223 on the R x 10,000 range, check the resistance between pin I and the battery case, and between pin J and the battery case. In each instance the resistance must be greater than 1 megohm.
- e. Again mount the protective cap on connector jack J541.
- f. Set the AN/USM-223 to the R x 10,000 range, and measure the resistance between pins F and O. The resistance must be infinity (open circuit).
- g. With the AN/USM-223 on the R x 10,000 range, measure the resistance between pins P and N. The resistance must be infinity (open circuit).
- h. Set the AN/USM-223 to the R x 10 range and measure the resistance between pins A and L. The resistance must be zero (short circuit).
- i. Measure the resistance between pins B and C. The resistance must be zero (short circuit).

**CAUTION**

**Be sure to perform the test inj below as quickly**

**as possible and with an ohmmeter that applies less than 10 milliamperes (ma) to the circuit. The AN/USM-223 applies a maximum of 5.2 ma in the resistance scales, and Test Set, Arming Mechanism (8020264) applies 9 ma to the circuit. DO NOT use the TS-352/U to make this measurement.**

- j. With the protective cap removed from connector J541, and with Test Set, Arming Mechanism 8020264 used as an ohmmeter, check the resistance between pins I and J. The resistance must be less than 9 ohms.

**NOTE**

**Test k and l below is to be performed with battery temperature less than 80. If necessary, cool battery by refrigeration (or other means) to insure battery temperature is below 80 F.**

- k. With the protective cap mounted on connector K541, and with the AN/USM-223 used as an ohmmeter on the R x 10 range, check the resistance between pins D and E. The resistance must be between 110 and 160 ohms.
- l. Check the resistance between pins G and H. The resistance must be less than 40 ohms.
- m. With the temperature of the battery less than 80 °F connect the test circuit as shown in figure 5. The 6-volt indicator lamp must light (q below).
- n. Connect the appliance plug to a 115 vac source. The ammeter should indicate approximately 0.8 to 0.9 amperes (q below).
- o. The 6-volt indicator lamp shall glow steadily, as the battery temperature rises. The 6-volt indicator lamp may

or may not extinguish before the ammeter indicates an open circuit. If the 6-volt indicator lamp remain on 10 minutes past the time the ammeter indicated an open circuit, slightly tap or jar the battery. If the 6-volt indicator does not extinguish, reject the battery as unserviceable.

p. When the 6-volt indicator lamp remains off for approximately 10 minutes, record battery temperature and time. Allow the heater power to remain on and record time and battery temperature the instant the ammeter indicates open circuit.

q. The battery is considered unserviceable if: (1) Monitor 6-volt indicator lamp is off at the start of test (a slight tap or jar could correct this problem).

(2) Ammeter indicates open circuit at the start of test (a slight tap or jar could correct this problem).

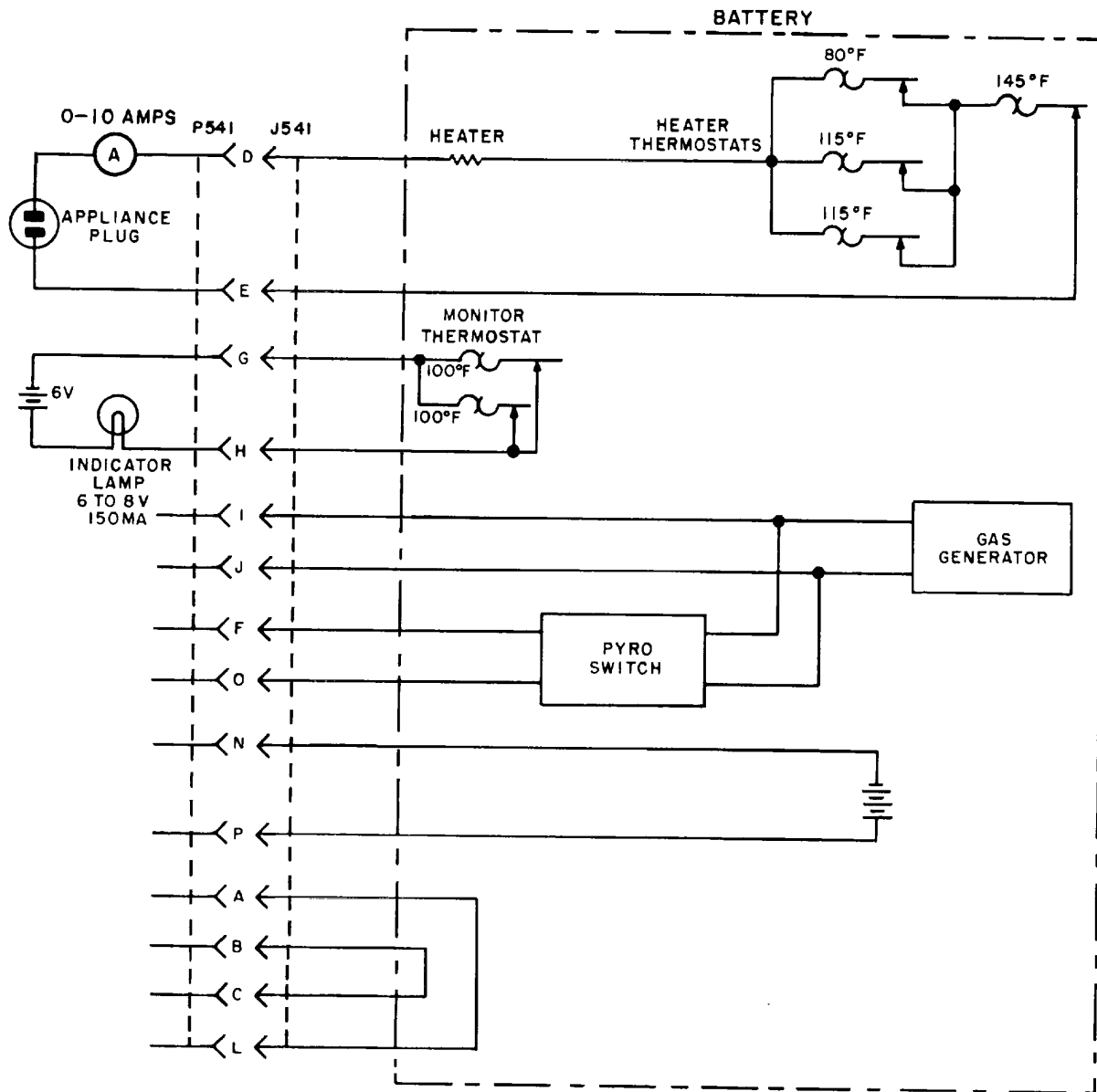
(3) Once the 6-volt monitor lamp extinguishes, it shall remain off until paragraph r below.

(4) Battery temperature reaches 125 F or greater.

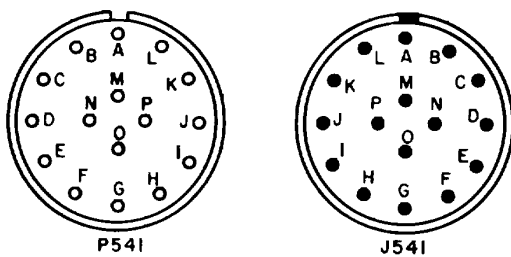
r. Allow the battery to cycle for 2 hours after the ammeter initially indicated an open circuit. Record battery temperature and time each instant the ammeter indicates a closed or open circuit.

s. At the end of the 2-hour cycling period, disconnect the 115 vac source and allow the battery to cool. Record the battery temperature the instant the 6-volt indicator lamp lights. If the battery temperature is less than 83 °F at this instant, the battery is unserviceable.

t. Disconnect the battery from the test circuit and install the protective cap on J541.



NOTE  
RECEPTACLE VIEWED FROM PIN OR RECEPTACLE SIDE.



EL1SR005

Figure 3-2. Serviceability Test Setup for Battery, Wet Primary BA-472C/U or BA-472D/U.

### 3-3. Serviceability Test for Battery, Wet Primary BA-485A/U and BA-485BfU

Serviceability tests should be conducted on new or off-the-shelf batteries before installation in a missile, on all batteries in the missile during regular teardown, and on all batteries turned in for any reason if they have not exceeded their shelf/service life. Inventory stock does not require testing until time of issue of use. To test the BA-485A/U or BA-485B/U, use the procedures in a through o below. If any of the conditions of these tests are not met, the battery must be considered as unserviceable. Refer to paragraph 3-4 for instructions on the disposition of unserviceable batteries.

a. Set the AN/USM-223 to the 50 volt dc scale and measure the potential between the positive (+) and negative (-) terminal posts. The potential must be 0 volt.

b. Set the AN/USM-223 to the R x 10,000 ohmmeter range and measure the resistance between the battery case and each of the exposed pins in connector J544 (pins A through J), and the + and terminal posts. The resistance for each must be infinity.

c. Mount connector P544 on connector J544 (with the shorting strap between pins C and E). Set the AN/USM-223 to the R x 10,000 range and measure the resistance between the + and terminal posts, and between pins A and G, pins D and F, pins D and J, and pins F and J. The resistance for each reading must be infinity.

d. Set the AN/USM-223 to the R x 10 range and measure the resistance between pins B and H. The resistance must be between 45 and 65 ohms.

#### CAUTION

**Perform the following tests as quickly as practicable, and with a low current ohmmeter. Use the AN/USM-223 if it is available. If the AN/USM-223 is not available, use an ohmmeter that applies less than 10 milliamperes. (The current output of Test Set, Arming Mechanism (8020264) is 9 milliamperes maximum.) DO NOT use the TS-352B/U for this test.**

e. Remove the mating plug P544 from connector J544 and measure the resistance between pins C and E. Do not prolong this test. The resistance must be between 20 and 35 ohms.

f. Construct a temperature chamber using the packing materials supplied with the battery, and the instructions TB 11-6135-200-25 in paragraph 3-1. Use

masking tape to secure the materials and to hold the thermometer against the battery case, on the same face as the connector.

g. With the temperature of the battery less than 80°F, connect the test circuit as shown in figure 3-3 to the battery (with shorting strap across pins C and E). The 6-volt indicator lamp must light (k below).

h. Connect the appliance plug to a 115 vac source. The ammeter should indicate approximately 3 amperes, (k below).

i. The 6-volt indicator lamp shall glow steadily, as the battery temperature rises. The 6-volt indicator lamp may or may not extinguish before the ammeter indicates an open circuit. If the 6-volt indicator lamp remains on 30 minutes past the time the ammeter indicated an open circuit, slightly tap or jar the battery. If the 6-volt indicator does not extinguish, the battery is unserviceable.

j. When the 6-volt monitor lamp remains off for approximately 10 minutes, record battery temperature and time. Allow heater power to remain on and record time and battery temperature the instant the ammeter indicates an open circuit.

k. The battery is considered unserviceable if: (1) Monitor 6-volt indicator lamp is off at the start of test (a slight tap or jar could correct this problem).

(2) Ammeter indicates open circuit at the start of test (a slight tap or jar could correct this problem).

(3) Once the 6-volt monitor lamp extinguishes, it shall remain off until paragraph n below.

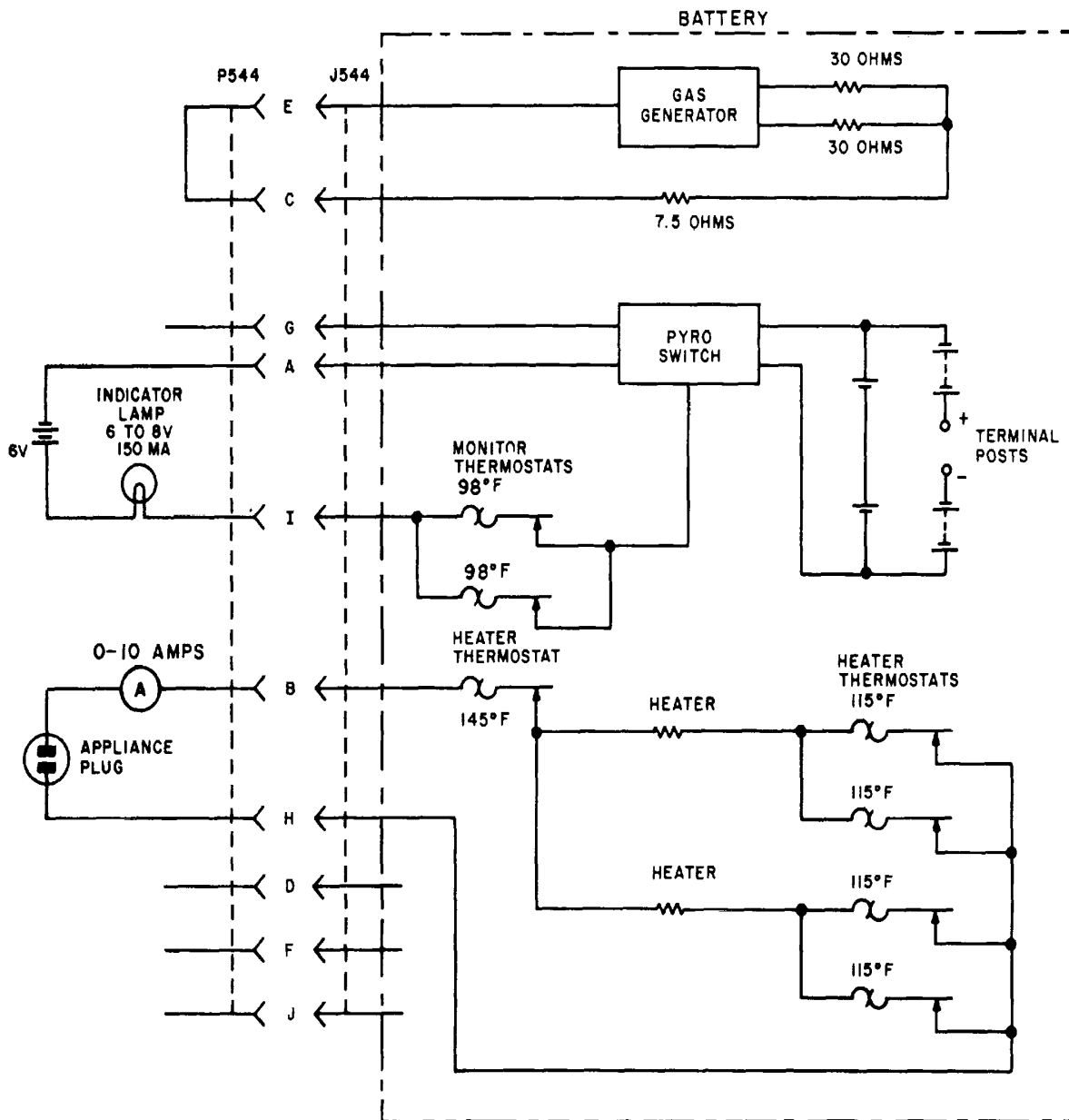
(4) Battery temperature reaches 125°F. or greater.

l. The ammeter can indicate a partial open circuit (1 1/2 amperes) for a period of time, then a complete open circuit as the temperature rises (record temperature and time).

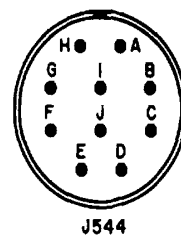
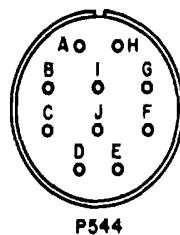
m. Allow the battery to cycle for 2 1/2 hours after the ammeter initially indicated an open circuit. Record battery temperature and time each instant the ammeter indicates a closed or open circuit.

n. At the end of the 2 1/2 hour cycling period, disconnect the 115 vac source and allow the battery to cool. Record the battery temperature the instant the 6-volt indicator lamp lights. If the battery temperature is less than 83 °F at this instant the battery is unserviceable.

o. Disconnect battery from test circuit and install Mating Connector P544 (NSN 5935-00-539-2230) on battery connector.



NOTE:  
RECEPTACLE VIEWED FROM PIN OR RECEPTACLE  
SIDE.



EL1SR006

Figure 3-3. Serviceability Test Setup for Battery, Wet Primary BA-485A/U or BA485B/U.

**3-4. Serviceability Tests for Battery, Wet Primary BA-486AIU or BA-486B/U**

The following tests should be performed by direct support whenever a BA-486A/U or BA-486B/U is turned in by the using organization for testing, or before the battery is issued to the using organization. If all of the test conditions are satisfied, the battery is considered serviceable and may be issued or returned to stock. If any of the conditions are not met, the battery is unserviceable and must be disposed of in accordance with the instructions in paragraph 3-14.

a. With the AN/USM-223 in the 50-volt dc range, check for potential between pins A and C of connector J2 and between pins B and D of J2. The potential in each measurement must be 0 volt.

b. Set the AN/USM-223 to the R x 10,000 range and measure the resistance between the battery case and each exposed pin on J1 (pins A through H, J through N, P, R through V) and each exposed pin on J2. Each measurement must be open (infinity).

c. Mount mating plug P1 on connector J1. Set the AN/USM-223 to the appropriate range and check the resistance specified in the chart below.

Pins	Resistance (ohms)
P1-A and P1-C	Between 1,420 and 1,740
P1-A and P1-D	Between 567 and 693
P1-E and P1-F	Less than 1 ( <i>observe caution note below</i> )
P1-H and P1-K	Between 23 and 32
P1-H and P1-T	Between 23 and 32
PI-L and P1-U	Less than 1
P1-M and J2-A	Less than 1
P1-N and J2-C	Less than 1
P1-P and J2-B	Less than 1
PI-R and J2-D	Less than 1

**CAUTION**

**In the event observation between P1-E and P1-F indicate open circuit (infinity), discontinue all testing and perform the following, in the sequence stated.**

(1) Construct a power source as shown in figure 3-4 (making certain switch is open).

(2) Connect power source positive potential to P I-C, negative potential to P1-A.

(3) Close switch and apply voltage for approximately 3 seconds.

(4) Open switch and disconnect power source from J 1 connector.

(5) Using AN/USM-223, measure for resistance between J1 -E and J1-F, proceed to d below if the resistance is less than 1 ohm (if the resistance is not less than 1 ohm, reject battery).

d. The gas generator circuit is in the safe condition and can not be activated when less than 1 ohm is indicated between J1-E and J1-F.

e. Construct a power source as shown in figure 3-4, making certain that the switch is in the open position.

f. Connect the power source positive potential to J I 1-D and negative potential to JI-A.

g. Close switch and apply voltage for 3 seconds. Open switch and remove power source from J1-D and JI-A (this will operate the gas generator control relay and reposition the gas generator circuit from testing).

h. The following test shall be performed as quickly as possible, with the current limited to 10 milliamperes or less. Using a AN/USM-223 or Test Set Arming Mechanism (8020264), measure the resistance between J I-A and J1-B, the resistance shall be between 1 to 5 ohms.

i. Using the AN/USM-223, measure the resistance between J I -E and J I -F, the resistance must be infinity (open circuit).

j. Connect the power source shown in figure 3-4, positive potential to J I-C and negative potential to J I-A.



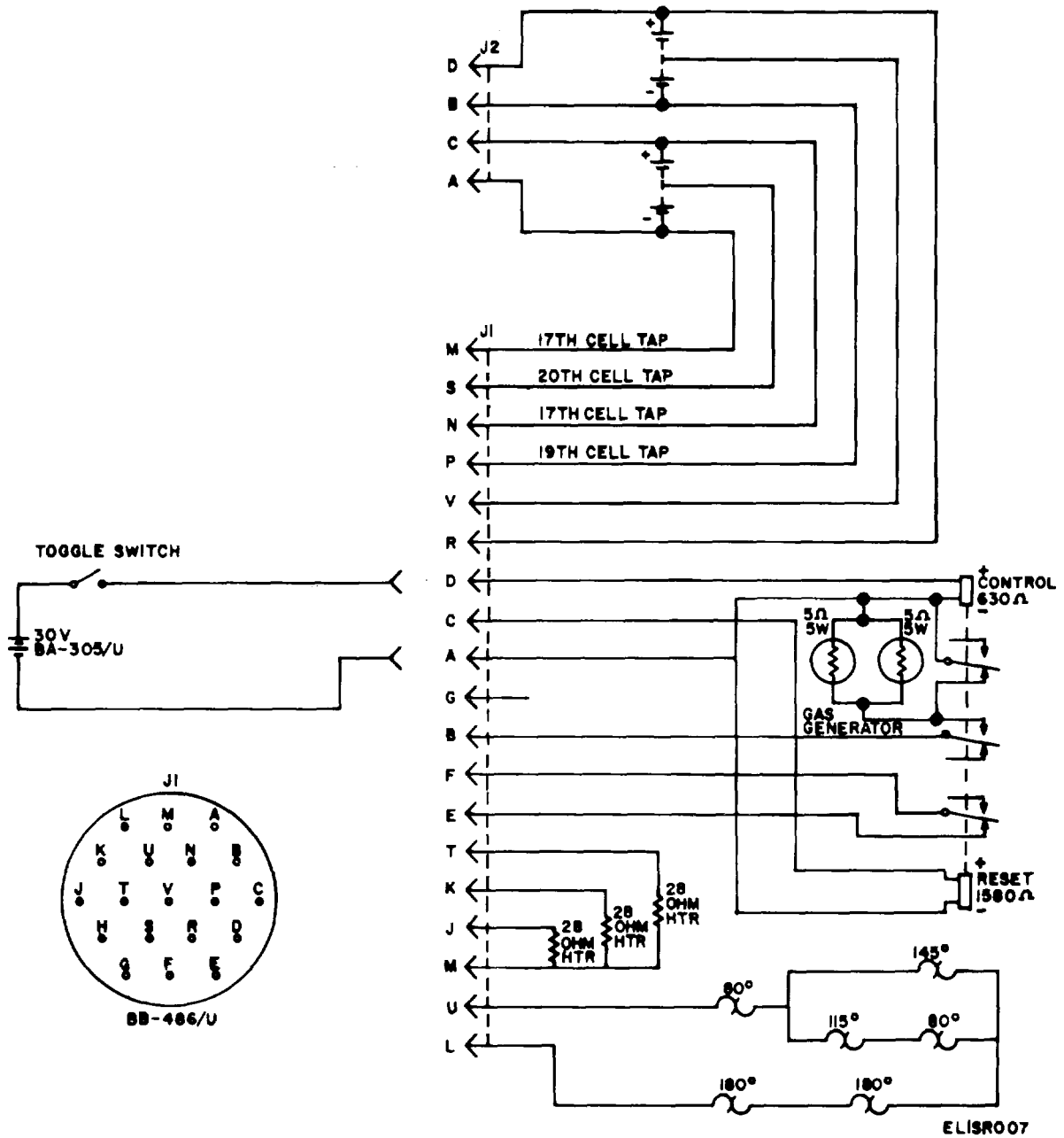


Figure 3-4. Serviceability Test Setup for Battery, Wet Primary BA 486A/U or BA-486B/U.

k. Close switch and apply voltage for 3 seconds (this will reposition the gas generator control relay to the safe position).

l. Open switch and remove the power source from J1-C and J1-A.

m. Using the AN/USM-223 measure for a resistance between J1-E and J1-F, resistance shall be less than 1 ohm, if not, battery is unserviceable.

### **3-5. Disposition of Unserviceable Batteries BA-472/U, BA-485/U, BA-486/U and BA-487/U**

a. Batteries covered in this bulletin are of the zinc-silver oxide type and contain significant amounts of recoverable precious metals.

b. Disposition of thermal batteries shall all be accomplished only under direction of CECOM in accordance with instruction cited below: Unserviceable batteries must be reported to CECOM. Upon receipt of the report, CECOM will forward disposition instructions within 30 days.

c. The technician performing the serviceability test must be explicit in the report of failure on the battery record form and include the following information: (1) Whether the battery initially failed while it was in a missile, and what was the indication of failure.

(2) If the battery failed during bench test, was it after TB 11-6135-200-25 removal from a missile or after shelf storage? (3) Detail the periods of shelf storage and in-missile installation.

(4) A copy of battery record power shall be forwarded with disposition request for each battery, as cited in paragraph 2-3a.

(5) If the battery was in storage, detail the type of storage including storage temperature and environment.

d. For unserviceable batteries less than 1 year old (as indicated on the battery nameplate), fill out and forward AMC Form 1229 (Unserviceable Materiel Report) to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-PA, Fort Monmouth, NJ 07703. Include a copy of the completed battery record form with the AMC for 1229.

e. For unserviceable batteries more than 1 year old, fill out and forward DA Form 2407 (Maintenance Request) and a copy of the battery record form to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-S, Fort Monmouth, NJ 07703.

f. Disposition instructions will be forwarded by CECOM within 30 days of receipt of the AMC Form 1229 or DA Form 2407. No disposition of the battery may be made before receipt of the instructions from CECOM.

## **SECTION IV**

### **PRESERVATION AND PACKAGING BATTERY, WET, PRIMARY BA-472C/U, BA-485A/U, BA-486A/U, AND BA-487/U**

#### **4-1. Battery, Wet, Primary BA-472C/U**

a. Preservation and Packaging. Preservation and packaging shall be levels A, B or C, as specified.

(1) *Level A.*

(a) *Cleaning.* Shall be in accordance with process C-I of MIL-P-116.

(b.) *Drying.* Drying shall be accomplished in accordance with the applicable procedures of MIL-P-116.

(c) *Preservation application.* None required.

(d.) *Prepackaging.* Batteries unit packaged in quantities greater than one each shall be individually placed in polyethylene bag fabricated of material conforming to L-O-378, type 1, grade B, finish I, having a maximum thickness of 2.0 mils. Closure of the bag shall be by heat seal.

(e) *Unit packaging.* Batteries in the quantities specified in the chart given in b below, of the same type and date of manufacture shall be packaged in accordance with method IC-2 of MIL-P-116. Batteries shall be placed in a close-fitting box conforming to PPP-B-566, variety I, or a close-fitting box conforming to PPP-B-636, type CF, class domestic, style optional. Closure shall be as specified in the appendix of the applicable box

specification. The boxed batteries shall be placed in a barrier bag fabricated of material conforming to L-P-378, type I, grade B, finish I, having a uniform thickness of 4.0 ± 0.5 mils. Closure of the bag shall be by heat seal. The bagged batteries shall be placed in a close-fitting paperboard box conforming to MIL-B-43014, or a close-fitting fiberboard box conforming to PPP-B-636, grade W6c or W5c, style optional. Close the box in accordance with the appendix to the applicable box specification.

(f.) *Terminal protection.* Any protruding battery terminal shall be protected by means of pads of corrugated fiberboard conforming to PPP-F-320, type CF, class domestic, variety SW. In case of protruding bare metal terminals not protected by insulation, the corrugated fiberboard pads shall be wax treated or protected by other equivalent insulating materials to prevent the bare metal terminals from contacting either the carton on unimpregnated fiberboard pads. Flat surface type terminals will be protected by a wax treated chipboard pad covering the area of the unit carton or by wax treating exterior surfaces of the unit carton.

(g) Packing. Packing shall be level A, B, or C as specified. Shipping containers for all levels shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container or its contents.

(h) Consolidation. A quantity of batteries, packaged as specified in (d) through (g) above, shall be packed within a close-fitting fiberboard box conforming to PPPB-636 type CF, class weather-resistant. Box closure shall be as specified in the appendix to the box specification.

To facilitate palletization, fiberboard boxes shall be uniform in size and contain equal quantities of the packaged items to the greatest extent practicable.

(t) Palletized load. A quantity of containers, packed as specified in (h) above shall be placed on a pallet, load type I, conforming to MIL-STD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be "bonded" to the pallet by strapping.

(j) Less than palletized load. When quantities per destination are less than a pallet load, the containers packed as specified in (h) above shall be waterproofed, with tape conforming to PPP-T-76, in accordance with the taping requirements of the appendix to the box specification. A quantity of the waterproofed containers shall be placed within a close-fitting box conforming to PPPB-601, overseas type; PPP-B-621 style 4, class 2; or PPPB-585, style 2 or class 3. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that the metal strapping shall conform to QQ-S-781, type 1, class B.

(2) *Level B.*

(a) *Consolidation.* A quantity of batteries shall be packed as specified in (l) (h) above.

(b) *Palletized load.* A quantity of containers shall be palletized as specified in (1) (l) above.

(c) Less than palletized load. When quantities of batteries per destination are less than a pallet load, the containers packed as specified in (a) above shall be reinforced by pressure-sensitive filament tape conforming to PPPT-97, type IV as specified in the appendix to the box specification, No further packing shall be required.

(3) *Level C.*

(a) *Consolidation.* A quantity of batteries shall be packed as specified in (l) (h) above, except that the fiberboard boxes shall be class domestic.

(b) Palletized load. A quantity of containers shall be palletized as specified in (1) (i) above, except that the fiberboard cap shall be class domestic.

18 (c) Less than palletized load. When quantities of batteries per destination are less than a pallet load, the containers packed as specified in (a) above shall be used as the shipping container. No further packing shall be required.

(d) Marking. In addition to any special marking required by the contractual document, unit packages, intermediate containers, and shipping containers shall be marked in accordance with MIL-STD-129. The date of manufacture shall also be shown on the unit package only, it shall be shown in code.

b. *Unit Package Quantity.* The unit package quantity of each battery is given in the chart below:

Type No.	NSN	Unit pkg qty.
BA-472C/U	6135-00-283-3034	1
BA-485A/U	6135-00-837-5331	1
BA-486A/U	6135-00-889-1502	1
BA-487/U	6135-00-876-0098	1

#### 4-2. Battery, Wet Primary BA-485A/U

a. Preservation and Packaging. Preservation and packaging shall be level A or C as specified.

(1) *Level A.*

(a) *Cleaning.* Battery BA-485A/U shall be cleaned in accordance with process C-I of MIL-P-116.

(b) *Drying.* Battery BA-485A/U shall be dried in accordance with the applicable procedure of MIL-P-1 16.

(c) *Preservation application.* None required.

(d) *Unit packaging.* Each Battery BA-485A/U shall be packaged in accordance with items 1, 2 and 3 of chart in paragraph b below and figure 4-1.

(e) *Level C.* Each Battery BA-485A/U shall be packaged as specified in (d) above except the fiberboard box (item 3 of the chart in b below) shall be class domestic. Closure shall be made in accordance with the appendix to the box specification.

(f) *Packing.* Packing shall be level A, B, or C as specified. Shipping containers for all levels shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container or its contents.

(g) Palletized load. A quantity of Battery BA-85A/U packaged as specified in (a) through (l) above, shall be placed on a pallet, load type conforming to MILSTD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate the marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be bonded to the pallet by strapping.

(h) Less than palletized load. When quantities of Battery BA-486A/U per destination are less than a pallet load the item packaged as specified in (a) through (l) above shall be waterproofed, with tape conforming to PPP-T-76, in accordance with the taping requirements of the appendix to the box specification. A quantity of waterproofed containers shall be placed within a closefitting box conforming to PPP-B-601, oversea type;

PPP-B-621, style 4, class 2; or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification or, if not specified, in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto, except that the metal strapping shall conform to QQS-781, type 1, class B.

(2) *Level B.*

(a) *Palletized load.* A quantity of Battery BA-485A/U, packaged as specified in (1) (a) through (l) above, shall be palletized as specified in (1) (q) above.

(b) *Less than palletized load.* When quantities of Battery BA-485A/U per destination are less than a pallet load a quantity of batteries, packaged as specified in (1) (a) through (l) above, shall be placed within a close-fitting fiberboard box conforming to PPP-B-640, class 2, style E; or PPP-B-636; type CF, class water-resistant, variety DW. The gross weight of boxes conforming to PPP-B-640 shall not exceed 250 pounds. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, containers will be pallet mounted on pallets conforming to MIL-P-15011 or

MIL-P-3938. Closure shall be in accordance with the appendix to the applicable box specification. Reinforcing shall be by nonmetallic strapping or pressure-sensitive filament tape banding conforming to PPP-S-760, type II and PPP-T-97, type IV respectively; selection of the material and application shall be in accordance with the appendix of the applicable box specification.

(3) *Level C.*

(a) *Palletized load.* A quantity of Battery BA-485A/U, packaged as specified in (1) (g) above except that the fiberboard caps shall be class domestic.

(d) *Less than palletized load.* When quantities of Battery BA-485A/U per destination are less than a pallet load, a quantity of batteries, packaged as specified in (1) (a) through (l) above, shall be packed as specified in (2) (b) above except that the fiberboard boxes shall conform to PPP-B-640 and PPP-B-636, class I and class domestic, respectively; and reinforcing shall not be required for boxes conforming to PPP-B-636.

(c) *Marking.* In addition to any special marking required by the contractual document, unit packages and shipping containers shall be marked in accordance with MIL-STD-129.

b. *Bill of Material.* The bill of material is given in the chart below:

Ref No	Item Nomenclature	No Req'd	Method MIL-P-116	Size (in.)			Requirements						
				L	W	D	Spec No	*T	*C	*V	*G	*F	*S
1	Battery, Wet Primary BA-485A/U	1	111	14 ¼	8 3/8	9							
2	Cushioning material un-compressed bound fiber	2		9 1/2	16 3/8	14	PPP-C-120						
3	Box, fiberboard	1		19 7/8	17	15	PPP-B-636	CF	(Routed out) WR	SW	V3c		

\*T-Type C-Class V-Variety G-Grade F-Flute S-Style

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*Figure 4-1. Typical Packaging Diagram For BA-485A/U.*

#### **4-3. Battery, Wet, Primary BA-486A/U**

a. Preservation and Packaging. Preservation and packaging shall be level A or C, as specified.

(1) *Level A*

(a) Cleaning. Battery BA-486A/U shall be cleaned in accordance with process C-I of MIL-P-116.

(b) Drying. Battery BA-486A/U shall be dried in accordance with the applicable procedure of MIL-P-116.

(c) Preservation (1) Application. None required.

(d) Unit packaging. Each Battery BA-486A/U shall be packaged in accordance with items 1 through 5 of the chart in paragraph b and figure 2-2.

(e) Battery BA-486A/U shall be packed in accordance with items 6, 7, 8 of figure 4-2 and the chart in b below. The box closure shall be in accordance with the appendix of the box specification.

(2) *Level B.* Battery BA-486A/U shall be packed as specified in (1) (e) above, except the nailed wood box shall be in class I and a fiberboard box conforming to PPP-B-636, type CF, class weather-resistant, also may be used. Closure shall be in accordance with the appendix to the applicable box specification.

(3) *Level C.* Battery BA-486A/U shall be packaged as specified in a (2) above, except the fiberboard box, item 5, shall be class domestic. Closure shall be made in accordance with the appendix to the box specification. Packing shall be level A, B or C, as specified. Battery BA-486A/U, packaged as specified in (1) (a) through (e), shall be packed in shipping containers that comply with

federal or military specifications, in a manner that will afford adequate protection to the package and its contents against physical and environmental deterioration and damage, during limited shipment, handling and intransit storage.

(4) *Marking.* In addition to any special marking required by the contractual document, unit packages and shipping containers shall be marked in accordance with MIL-STD-129.

*b. Bill of Material.* The bill of material is given in the chart below:

Ref No	Item Nomenclature	No Reqd	Method MIL-P-116	Size (in.)			Requirements								
				L	W	D	Spec No	*T	*C	*V	*G	*F	*S		
1	Battery, Thermal BA-486A/U	1	IC-5	13 ½	11 ½	6 ½									
2	Polystyrene	2		13 ½	1 ¾	6 ½	MIL-P-40619	1	2		B				
3	Polystyrene	1		13 ½	15 ½	2	MIL-P-40619	1	2		B				
4	Polystyrene	2		11 ½	1	6 ½									
5	Box, fiber tape	1		15 ½	13 ½		PPP-B-636	1	2		V3c	C	RSC		
	pressure sensitive	2		20	2		PPP-T-76								
		4		16	2		PPP-T-76								
		1		8 ½	2		PPP-T-76								
6	Cushioning material un-compressed bound fiber**	2		15 ¾			PPP-C-1120	IV							
7	Box, wood	1		23 ¾	21 ¾	16 ¾	PPP-B-621	1			2			4	
8	Strapping steel	2		90	¾	0.020	QQ-781	1	B		21				

\*T-Type C-Class V-Variety G-Grade F-Flute S-Style

\*\*Inside dimensions are 4 inches for wall thickness and 8 1/8 inches for outside height.

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*Figure 4-2. Typical Packaging Diagram for BA-486A/U.*

#### **4-4. Battery, Wet, Primary BA-487/U**

*a. Preservation and Packaging.* Preservation and packaging shall be level A or C, as specified.

(1) *Level A.*

*(a) Cleaning.* Battery BA-487/U shall be cleaned in accordance with process C-1 of MIL-P-116.

*(b) Drying.* Battery BA-487/U shall be dried in accordance with the applicable procedure of MIL-P-116.

*(c) Preservation application.* None required.

*(d) Unit packaging.* Each battery BA-487/U shall be packaged in accordance with items 1 through 6 of the chart below and figure 2-3.

*(e) Palletized load.* A quantity of Battery BA-487/U, packaged as specified in (a) through (d) above, shall be placed on a pallet load type 1, conforming to MIL-STD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate the marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be bonded to the pallet by strapping.

(F) *Less than palletized load.* When quantities of Battery BA-487A/U per destination are less than a pallet load the item packaged as specified in (a) through (d) above, shall be waterproofed with tape conforming to PPP-T-76 in accordance with the taping requirements of the appendix to the box specification. A quantity of waterproofed containers shall be placed within a closefitting box conforming to PPP-B-601, overseas type; PPP-B-621, style 4, class 2; or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification or if not mentioned in the specification in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that the metal strapping shall conform to QQ-S-781, type 1, class B.

(2) *Level B.*

(a) *Palletized load.* A quantity of Battery BA-487A/U, packaged as specified in (1) (a) through (d) above, shall be palletized as specified in (1) (e) above.

(b) *Less than palletized load.* When quantities of Battery BA-487A/U per destination are less than a pallet load, a quantity of batteries, packaged as specified in (1) (a) through (d) above, shall be placed within a close fitting fiberboard box conforming to PPP-B-640, class 2, style E; or PPP-B-636, type CF, class weather-resistant, variety DW. The gross weight of boxes conforming to PPP-B-640 shall not exceed 250 pounds. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, containers will be pallet mounted on pallets conforming to MIL-P-15011 or MIL-P-3938. Closure TB 11-6135-200-25 shall be in accordance with the appendix to the applicable box specification. Reinforcing shall be by nonmetallic

strapping or pressure-sensitive filament tape banding conforming to PPP-S-760, type 11 and PPP-T-97, type IV respectively; selection of the material and application shall be in accordance with the appendix of the applicable box specification.

(3) *Level C.* Battery BA-487/U shall be packaged in accordance with items I through 6 of chart in b below and figure 10 except the fiberboard box and cells shall be class domestic. Box closure shall be in accordance with the appendix to the box specification.

(a) *Palletized load.* A quantity of Battery BA-487/U, packaged as specified in (1) (a) through (d), shall be palletized as specified in (1) (e) except that the fiberboard' caps shall be class domestic.

(b) *Less than palletized load.* When quantities of Battery BA-487/U per destination are less than a pallet load, a quantity of batteries, packaged as specified in (1) (a) through (d) shall be packed as specified in (1) (J) except that the fiberboard boxes shall conform to PPPB-640 and PPP-B-636, class I and class domestic respectively; and reinforcing shall not be required for boxes conforming to PPP-B-636.

(4) *Packing.* Packing shall be level A, B or C, as specified. Shipping containers for all levels shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container or its contents.

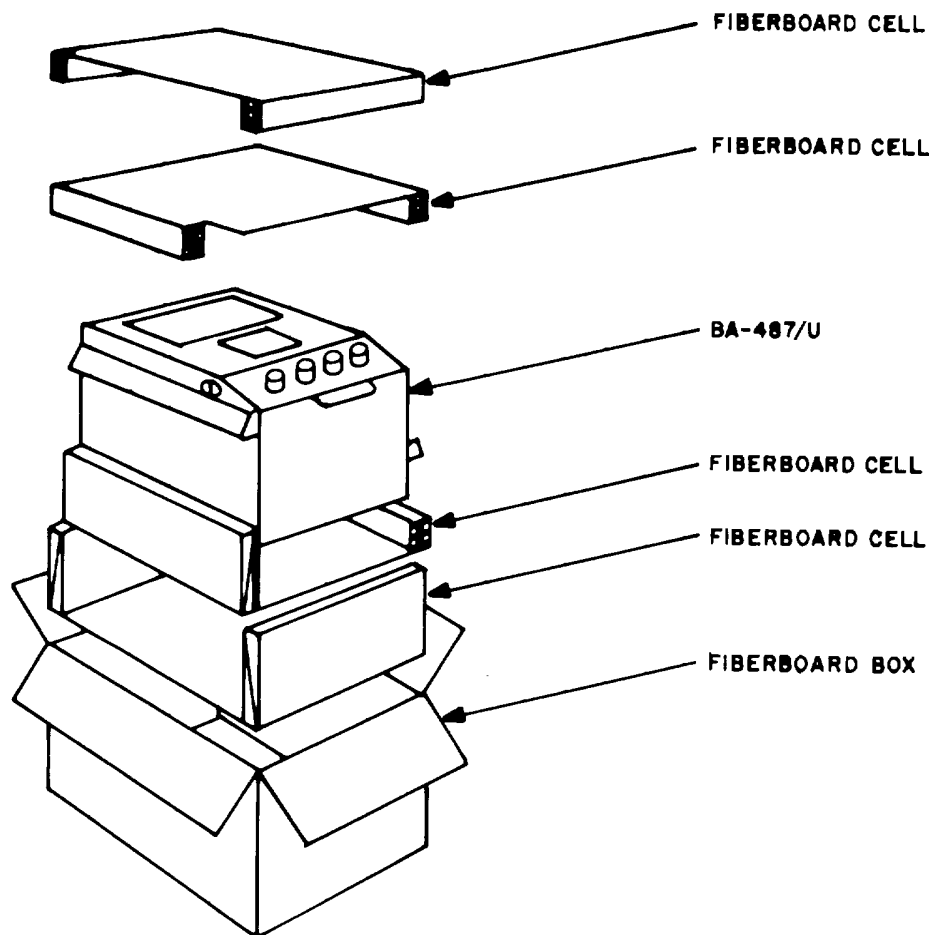
(5) *Marking.* In addition to any special marking required by the contractual document, unit packages and shipping containers shall be marked in accordance with MIL-STD129.

b. *Bill of Material.* The bill of material for BA-487/U is given in the chart below:

Ref No	Item Nomenclature	No Reqd	Method MIL-P-116	Size (in.)			Requirements						
				L	W	D	Spec No	*T	*C	*V	*G	*F	*S
1	Battery, BA-487/U	1	111	13 ¼	11								
2	Cell, Fiberboard	1		13 ¼	11	2 ½	PPP-F-320	CF	W	R	SW	W5c	
3	Cell, Fiberboard	1		13 ¼	11	2 ½	PPP-F-320	CF	W	R	SW	W5c	
4	Cell, Fiberboard	1		11	11 ¼	2 ½	PPP-F-320	CF	W	R	SW	W5c	
5	Cell, Fiberboard	1		13 ¼	11	8 7	PPP-F-320	CF	W	R	SW	W5c	
6	Box, Fiberboard	1		13 ¾	11 ¼	12 ½	PPP-B-636	CF	W	R	SW	W5c	

\*T-Type C-Class V-Variety G-Grade F-Flute S-Style





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Figure 4-3. Typical packaging Diagram for BA-487/U

**SECTION V  
TECHNICAL DATA AND SERVICE LIFE**

**5-1. Description of Batteries, Dry, Thermal.**

The chart below lists the Batteries, Dry Thermal, B-415, 13A-605/U, BA-617/U, BA-618/U, BA-627/U, IIA-628/U, 13A-629/U and BA-630/U, covered in Section VI with their shelf/service life.

Battery Type	National Stock Number	Shelf/Service Life (years)
Battery, Dry Thermal		
B-415	6135-00-655-2279	12
BA-605/U	6135-00-546-6273	20
BA-617/U	6135-00-767-0331	18
BA-618/U	6135-00-603-4859	5
BA-627/U	6135-00-999-9141	12
BA-628/U	6135-00-930-1570	12
BA-629/U	6135-00-255-1340	7
BIA-630/U	6135-00-237-1703	7

**5-2. Technical Date Shelf/Service Life.**

**SECTION VI**

**SERVICEABILITY TEST FOR BATTERY, DRY, THERMAL B-415, BA-605/U, BA-617/U, BA-618/U, BA-627/U, BA-628/U, BA-629/U, AND BA-630/U**

**6-1. Serviceability Test for Battery, Dry Thermal, B-415.**

a. Visual Inspection. All batteries shall be visually inspected to verify if any of the imperfections listed below exist.

(1) Loose, bent or cracked terminals.

- (2) Terminal or battery corrosion.
- (3) Imperfect solder bead under top flange.
- (4) Foreign substance which prevents good electrical contacts.
- (5) Loose or cracked terminal seals.

*b. Electrical Test.*

(1) *Voltage Potential.* Using a voltmeter (0-50 vdc) measure for a voltage potential between the positive (+) and negative (-) battery terminals, potential shall be zero. Reduce the voltage range (0-0.5 vdc or lower) and measure for a voltage potential, the potential shall be zero.

(2) *Squib Resistance.* Using an ignition circuit tester (Allegheny Instrument, Model #101-5A or approved equal), measure the resistance of each Squib circuit between the terminals listed below, the resistance shall be 1.3 ohms +0.15 ohms.

<i>Squib Circuit Terminal</i>	<i>OHMIC Value</i>
T & S	1.3 +0.15 ohms
B & S	1.3 ±0.15 ohms

*c. Insulation Resistance.* This test shall be conducted in three parts, utilizing a 500 vdc megohmmeter (Weston Model #796 or approved equal).

(1) *First Part.* All battery terminals (Squib and output) shall be connected to one common connection point. Apply 500 vdc positive (+) potential to be ganged connection point and the negative (-) potential to the battery case, for a minimum of 15 seconds. The insulation resistance should exceed 5 megohms.

(2) *Second Part.* Apply 500 vdc for a minimum of 5 seconds between the battery positive (+) and negative (-) output terminals. The insulation resistance should exceed 5 megohms.

(3) *Third Part.* Apply 500 vdc positive (+) potential to battery output terminals and negative (-) potential to all Squib terminals for a minimum of 5 seconds. The insulation resistance shall be 5 megohms, minimum. Repeat *b* above.

**6-2. Serviceability Test for Battery, Dry Thermal BA-605/U.**

a. *Visual and Mechanical Inspection.*

(1) *Weight* The battery weight shall not exceed 150 grams.

(2) *Batteries, materials and component parts* shall be inspected to verify that the materials, component parts and construction are in accordance with applicable specifications. If any of the imperfections as listed below exist, the battery will be considered defective. However, the battery should be activated (if possible) after properly annotating the specific failures to requirements specified.

(a) *Loose or cracked terminals seals.* Cracked terminals are acceptable if they have successfully passed the leak test.

(b) *Corroded or bent terminals.*

(c) *Foreign substances which prevent good electrical contacts.*

(d) *Cases which are welded poorly, cracked or TB 11-6135-200-25 have pinholes.*

(e) *Nonconformance of labels and markings.*

(f) *The plated exterior of the battery case* shall not be blistered, chipped, scaled, dented and must be free from all surface defects.

(g) *Battery connector pins* for signs of corrosion, missing or flaking of plating or deterioration.

(h) *Examine all grommets* for cracks, holes, tears, etc., note all observations.

(i) *Poorly seated primer.*

(j) *Primer with a fold, wrinkle, scratch, scale, dents or other injurious surface defect.*

*b. Insulation Resistance.* The insulation resistance of the battery shall be greater than 10 megohms, when applying 500 ± 20 vdc and limiting the current to 5 milliamperes, between each of the battery terminal contacts and battery case. Potential shall be applied to each test circuit for a maximum of 5 minutes. The insulation resistance shall not be less than 20 megohms. Record all measurements.

**6-3. Serviceability Test for Battery, Dry Thermal BA-617/U.**

a. *Visual Inspection.* Inspect for the following:

(1) *Loose or cracked terminals.*

(2) *Corroded or bent terminals.*

(3) *Foreign substances which prevent good electrical contact or interfere with the movement of the striker.*

(4) *Poorly seated primer, dents or surface defects.*

(5) *Striker with a fold, wrinkle, dent or other surface defects.*

(6) *Corrosion of case or connector.* Note and report all imperfections and the serial number of the battery.

*b. Electrical Test.*

(1) Using a voltmeter on the 0-25 vdc range, measure the potential across the positive (+) and negative (-) terminals. The potential must be zero.

(2) Reduce the voltmeter range to 0-0.5 or lower and measure the potential. The potential must be zero.

(3) Measure the insulation resistance between each terminal and the case, applying 500 ± 20 vdc, for 1 minute maximum. The insulation resistance must be at least 100 megohms. Current shall be limited to 5 milliamperes.

**6-4. Serviceability Test for Battery, Dry Thermal BA-618/U**

a. *Visual and Mechanical Inspection.* Batteries, materials and component parts shall be inspected to verify that the materials, component parts and construction are in accordance with applicable specifications. If any of the imperfections as listed below exist, the battery will be considered defective.

(1) *Loose or cracked terminal seals.*

(2) *Corroded or bent terminals.*

- (3) Nonconformance of label markings.
- (4) Foreign substances which prevent good electrical contact.
- (5) Cases which are welded poorly, cracked or have pinholes.
- (6) Materiel (chips and filings which affect operation).
- (7) Battery exterior case shall not be blistered, chipped, scaled or dented.
- (8) Absence of expended battery indicator (inactivated state pink, discharged state purple). Any battery expended indicator found to be purple shall be classified a failure and checked to assure battery has been activated.

b. Electrical Tests.

(1) Voltage Potential. Using a voltmeter (0-50 vdc), check for a voltage potential between the battery positive (+) and negative (-) terminals, the potential shall be zero. Reduce the voltmeter range (0-0.5 vdc or lower) and measure for a voltage potential, the potential shall be zero.

(2) Electrical Match (Squib) Resistance. The resistance measurement equipment shall apply a current of 50 ± 5 milliamperes to the M and M terminals of the battery. The resistance of the electrical match shall be 4.50 ± 0.50 ohms. (Alinco Model 105-5A igniter test or approved equal).

c. Insulation Resistance. The insulation resistance shall be measured with a 500 ± 20 vdc megohmmeter (Weston Model #796 or approved equal). The 500 ± 20 vdc shall be applied to the battery terminals and for the specified time stated in the chart below. The battery insulation resistance shall not be less than 1 megohm. Current shall be limited to 5 milliamperes during test.

500 vdc potential.

Positive	Negative	Minimum Time Period
+ terminal	-M & M terminal	5 seconds
+ terminal	Battery case	5 seconds
- M & M terminal	Batter), case	5 seconds
M terminal	Battery case	5 seconds

**6-5. Serviceability Test for Battery, Dry Thermal BA-627/U.**

a. Visual Inspection. All batteries shall be visually inspected to verify if any of the imperfections listed below exist:

- (1) Loose or cracked terminal seals.
- (2) Corroded or bent terminals.
- (3) Nonconformance of labels and markings.
- (4) Foreign substances which prevent good electrical contacts.
- (5) Cases which are welded poorly, cracked or have pinholes, blistered case, scales, dents and must be free from surface defects.
- (6) Absence of expended battery indicator (inactivated state pink, discharge state purple). Any battery expended indicator found to be purple shall be classified a failure and checked to assure battery has been activated.

b. Electrical Tests.

(1) Voltage Potential. Using a voltmeter (0-50 vdc) check for a voltage potential between the battery positive (+) and M negative (-) terminal, the potential shall be zero. Reduce the voltmeter range (0-0.5 vdc or lower) and check for a voltage potential, the potential shall be zero.

(2) Electrical Match (Squib) Resistance: Using an Alinco Igniter Circuit Tester, Model 101-5A (or approved equal), measure the resistance of the electrical match between the battery terminals M and M-, the resistance shall be 4.50 ± 0.50 ohms.

(3) Insulation Resistance: The insulation resistance shall be measured by applying 500 ± 20 vdc to the battery terminal and for the specified time stated in the chart below. The battery insulation resistance shall not be less than 1 megohm, current shall be limited to 5 milliamperes during test.

500 vdc potential

Positive	Negative	Minimum Time Period
+ terminal	-M & M terminal	5 seconds
+ terminal	Battery case	5 seconds
-M & M terminal	Battery case	5 seconds
M terminal	Battery case	5 seconds

**6-6. Serviceability Test for Battery, Dry Thermal BA-628/U.**

a. Visual and Mechanical Inspection. Batteries, materials and component parts and construction are in accordance with applicable specifications. If any of the imperfections as listed below exist, the battery will be considered defective:

- (1) Loose or cracked terminal seals.
- (2) Corroded or bent terminals.
- (3) Nonconformance of label markings.
- (4) Foreign substances which prevent good electrical contact.
- (5) Cases which are welded poorly, cracked or have pinholes.
- (6) Materiel (chips and filings which affect operation).
- (7) Battery exterior case shall not be blistered, chipped, scaled or dented.
- (8) Absence of expended battery indicator (inactivated state pink, discharged state purple). Any battery expended indicator found to be purple shall be classified a failure and checked to assure battery has been activated.

b. Electrical Tests.

(1) Voltage Potential. Using a voltmeter (0-50 vdc) measure for a voltage potential between the battery positive (+) and negative (-) terminals, the potential shall be zero. Reduce the voltmeter range (0-0.5 vdc or lower) and measure for a voltage potential, the potential shall be zero.

(2) Electrical Match (Squib) Resistance. The resistance measurement equipment shall apply a current of 50 ± 5 milliamperes to the M and -M terminals for the battery. The resistance of the electrical match shall be 4.50

± 0.50 ohms. (Alinco Model 101-5A Igniter Circuit Tester or approved equal).

c. Insulation Resistance. The insulation resistance shall be measured with a 500 ± 20 vdc megohmmeter, (Weston Model #796 or approved equal). The 500 ± 20 vdc shall be applied to the battery terminals and for the specified time stated in the chart below. The battery insulation resistance shall not be less than 1 megohm. Current shall be limited to 5 milliamperes during test.

500 vdc potential

Positive	Negative	Minimum Time Period
+ terminal	-M & M terminal	5 seconds
+ terminal	Battery case	5 seconds
- M & M terminal	Batter), case	5 seconds
M terminal	Battery case	5 seconds

**6-7. Serviceability Test for Battery, Dry Thermal BA-629/U.**

a. *Visual Inspection.* Examine all battery headers and cases for cracks, dents, scratches, breaks, burrs, loose parts, etc. Examine all connector pin contacts for signs of corrosion, missing or flaking plating, bent pins, etc. Examine all grommets for cracks, holes, tears, or deterioration.

b. *Circuit Resistance.* Using the four-wire method (volt-ampere method) measure and record the ohms values between battery connector A and B, H and A, H and B, F and E, E and D, and F and D, record all measurements.

c. *Battery Voltage.* The voltage of the battery at room Temperature, shall not exceed 0.05 volts dc when measured with a voltmeter with input impedance of 100 megohms or greater, when connected between pin D (positive) and pin A (negative); between pin E (positive) and pin B (negative); and between pin F (positive) and pin H (negative) of the battery connector.

d. *Squib Circuit Resistance.* The squib resistance shall be measured across pins J and K of the battery

connector and shall be 0.45 to 0.65 ohms. The maximum current during this test shall be limited to 10 milliamperes. This test should be performed as quickly as possible.

e. Insulation Resistance. The insulation resistance of the battery shall be greater than 10 megohms, when applying 500 ± 50 vdc and limiting the current to 5 milliamperes, between each of the battery connector contacts and battery case. Potential shall be applied to each test circuit for a maximum of 2 minutes.

**6-8. Serviceability Test for Battery, Dry Thermal BA-630/U.**

a. *Visual Inspection.* Examine all battery headers and cases for cracks, dents, scratches, breaks, burrs, loose parts, etc. Examine all connector pin contacts for signs of corrosion, missing or flaking plating, bent pins, etc. Examine all grommets for cracks, holes, tears, or deterioration, etc. Note all observations.

b. *Battery Voltage.* The voltage of the battery at room temperature, shall not exceed 0.05 volts dc when measured with a voltmeter with input impedance of 100 megohms or greater when connected between pin F (positive) and pin B (negative) of the battery connector.

c. *Squib Circuit Resistance.* The squib resistance shall be measured across pins J and K of the battery connector and shall be 0.45 to 0.65 ohms. The maximum current during this test shall be limited to 10 milliamperes. This test should be performed as quickly as possible.

d. *Insulation resistance.* The insulation resistance of the battery shall be greater than 10 megohms, when applying 500 ± 50 vdc and limiting the current to 5 milliamperes, between each of the battery connector contacts and the battery case.

**SECTION VII**

**PRESERVATION AND PACKAGING BATTERY, DRY, THERMAL**

**7-1. Battery, Dry, Thermal B-415, BA-605/U, BA-617/JU, BA-6271U, BA-628/U, BA-629/U and BA-630/U**

a. Preservation and Packaging. Preservation and packaging shall be level A, B, or C, as specified.

(1) Level A.

(a) Cleaning. Cleaning shall be accomplished in accordance with process C-I of MIL-P-116.

(b) Drying. Drying shall be accomplished in accordance with the applicable procedures of MIL-P-116.

(c) Preservation application. None required.

(d) Prepackaging. Batteries unit packaged in quantities greater than one each shall be individually placed in polyethylene bag fabricated or material conforming to L-P-378, type 1, grade B, finish 1, having minimum thickness of 2.0 mils. Closure of the bag shall be by heat seal.

(e) Unit packaging. Batteries in the quantities specified in the chart given in paragraph 2, and of the same type and date of manufacture shall be packaged in accordance with method IC-2 of MIL-P-116. Batteries shall be placed in a close-fitting box conforming to PPPB-566, variety 1, or a close-fitting box conforming to PPP-B-636, type CF, class domestic, style optional. Closure shall be as specified in the appendix to the applicable box specification. The boxed batteries shall be placed in a barrier bag fabricated of material conforming to L-P-378, type I, grade B, finish I, having a uniform thickness of 4.0 +0.5 mils. Closure of the bag shall be by heat seal. The bagged batteries shall be placed in a close-fitting paperboard box conforming to Mil.B-43014, or a close-fitting fiberboard box conforming to PPP-B-636, grade W6c or W5c, style optional. Close the box in accordance with the appendix to the applicable box specification.

(f) *Terminal protection.* Any protruding battery terminal shall be protected by means of pads of corrugated fiberboard conforming to PPP-F-320, type CF, class domestic, variety SW. In case of protruding bare metal terminals not protected by insulation, the corrugated fiberboard pads shall be wax treated or protected by other equivalent insulating materials to prevent the bare metal terminals from contacting either the carton or unimpregnated corrugated fiberboard pads. Flat surface type terminals will be protected by a wax treated chipboard pad covering the area of the unit carton or by wax treating exterior surfaces of the unit carton.

(g) *Packing.* Packing shall be level A, B, or C, as specified. Shipping containers for all levels shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container or its contents.

(h) *Consolidation.* A quantity of batteries, packaged as specified in (d) through (g) above, shall be packed within a close-fitting fiberboard box of conforming to PPP-B-636, type CF, class weather-resistant. Box closure shall be as specified in the appendix to the box specification. To facilitate palletization, fiberboard boxes shall be uniform in size and contain equal quantities of the packaged items to the greatest extent practicable.

(i) *Palletized load.* A quantity of containers, packed as specified in (h) above shall be placed on a pallet load type 1, conforming to MIL-STD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s of V3c. The load shall be "bonded" to the pallet by strapping.

(j) *Less than palletized load.* When quantities per destination are less than a pallet load, the containers packed as specified in (h) above shall be waterproofed, with tape conforming to PPP-T-76, in accordance with the taping requirements of the appendix to the box specification. A quantity of the waterproofed containers shall be placed within a close-fitting box conforming to PPP-B-601, overseas type, PPP-B-621 style 4, class 2; or PPP-B-585, style 2 or class 3. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that the metal strapping shall conform to QQ-S-781, type 1, class B.

(2) *Level B.*

(a) *Consolidation.* A quantity of batteries shall be packed as specified in (1) (h) above.

(b) *Palletized load.* A quantity of containers shall be palletized as specified in (1) (i) above.

(c) *Less than palletized load.* When quantities of batteries per destination are less than a pallet load, the containers packed as specified in (a) above shall be reinforced by pressure-sensitive filament tape conforming to PP-T-97, type IV as specified in the appendix to the box specification. No further packing shall be required.

(3) *Level C.*

(a) *Consolidation.* A quantity of batteries shall be packed as specified in (1) (h) above, except that the fiberboard boxes shall be class domestic.

(b) *Palletized load.* A quantity of containers shall be palletized as specified in (1) (i) above, except that the fiberboard cap shall be class domestic.

(c) *Less than palletized load.* When quantities of batteries per destination are less than a pallet load, the containers packed as specified in (a) above shall be used as the shipping container. No further packing shall be required.

(d) *Marking.* In addition to any special marking required by the contractual document, unit packages, intermediate containers, and shipping containers shall be marked in accordance with MIL-STD-129. The date of manufacture shall also be shown, on the unit package only, it shall be shown in code.

b. *Unit Package Quantity.* The unit package quantity of each battery is given in the chart below:

Type No.	NSN	Unit pkg. qty.
B-415	6135-00-655-2279	6
BA-605/U	6135-00-546-6273	2
BA-617/U	6135-00-767-0331	1
BA-618/U	6135-00-603-4859	1
BA-627/U	6135-00-999-9141	1
BA-628/U	6135-00-930-1570	1
BA-629/U	6135-00-255-1340	2
BA-630/U	6135-00-237-1703	2

**7-2. Battery, Dry Thermal BA-618/U**

a. *Preservation and Packaging.* Preservation and packaging shall be level A or C, as specified.

(1) *Level A.*

(a) *Cleaning.* Battery BA-618/U shall be cleaned in accordance with process C-1 of MIL-P-116.

(b) *Drying.* Battery BA-618/U shall be dried in accordance with the applicable procedure of MIL-P-116.

(c) *Preservation application.* None required.

(d) *Unit Packaging.* Each Battery BA-618/U shall be packaged in accordance with items 1 through 4 of the chart b below and fig. 3-1.

(e) *Consolidation.* A quantity of Batteries BA-618/U, packaged as specified in (a) through (d) above, shall be packed within a close-fitting fiberboard box conforming to PPP-B-636, type CF, class weatherresistant. Box closures shall be as specified in the appendix of the box specification. To facilitate palletization, fiberboard boxes shall be uniform in size and contain equal quantities of the packaged items.

(f) *Palletized load.* A quantity of containers, packed as specified in paragraph 5.2.1.1 of PPP-B-636 shall be placed on a pallet, load type 1, conforming to MILSTD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather-resistant, W5s or V3c. The load shall be bonded to the pallet by strapping.

(g) *Less than palletized load.* When quantities per destination are less than a pallet load, the containers packed in (e) above shall be waterproofed, with tape conforming to PPP-T-76, in accordance with the taping requirements of the appendix of the box specification. A quantity of the waterproofed containers shall be placed within a close-fitting box conforming to PPP-B-601, overseas type; PPP-B-621, type 4, class 2, or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds, or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that metal strapping shall conform to QQ-S-781, type 1, class B.

(2) *Level B.*

(a) *Consolidation.* A quantity of Battery BA-618/U, packaged as specified in (l) (a) through (d) above, shall be packed as specified in (1) (e) above.

(b) *Palletized load.* A quantity of containers, packed as specified in (1) (e) above shall be palletized as specified in (l) (f) above.

(c) *Less than palletize load.* When quantities per destination are less than a pallet load, the containers packed as specified in (l) (e) above shall be reinforced by pressure-sensitive filament tape conforming to PPPT-97, type IV as specified in the appendix to the box specification. No further packing shall be required.

(3) *Level C.*

(a) Each Battery BA-618/U shall be packaged in accordance with item 1 through 4 of the chart below and figure 7-1.

(b) *Consolidation.* A quantity of Battery BA-618/U, packaged as specified in (l) (a) through (d) above, shall be packed as specified in (1) (e) above, except that the fiberboard boxes shall be class domestic.

(c) *Palletized load.* A quantity of containers, packed as specified in (b) above shall be palletized as specified in (1) (1) above, except that the fiberboard shall be domestic.

(d) *Less than palletized load.* When quantities per destination are less than a pallet load, the containers packed as specified in (b) above shall be used as the shipping container. No further packing shall be required.

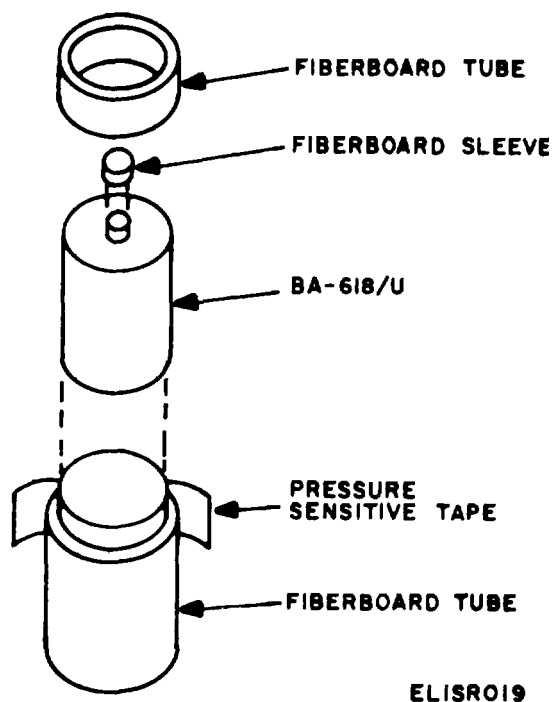
(4) *Packing.* Packing shall be level A, B, or C as specified. Shipping containers for all levels shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container or its contents.

(5) *Marking.* In addition to any special marking required by the contractual document, unit packages, intermediate containers, and shipping containers shall be marked in accordance with MIL-STD-129. The date of manufacture shall also be shown on the unit package only, it shall be shown in code.

b. *Bill of Material.* The bill of material for BA-618/U is given in the chart below:

Ref No	Item Nomenclature	No Reqd	Method MIL-P-116	Size (in.)			Requirements						
				L	W	D	Spec No	*T	*C	*V	*G	*F	*S
1	Battery, Thermal BA-618A/U	1	IC-4	3	Dia 4 ½								
2	Fiberboard Sleeve	1		1	Dia X1		MIL-C-3955						
3	Fiberboard Tube	1					MIL-C-3955	11	1		B		B
4	Pressure-Sensitive Tape	1					PPP-T-76						

\*T-Type C-Class V-Variety G-Grade F-Flute S-Style



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Figure 7-1. Typical Packaging Diagram for BA-618/U.

## SECTION VIII SPECIAL STORAGE INSTRUCTIONS

### 8-1. Preservation, Packaging, and Packing.

Preservation, packaging, and packing will be in accordance with the requirements listed in sections IV and VII.

### 8-2. Marking.

Marking will be in accordance with MIL-STD-129D.

### 8-3. Storage.

*a. Type.* Controlled humidity warehouse, heated warehouse.

*b. Age Control.* Missile batteries will be issued on a first-in-first-out (FIFO) basis by date of manufacture or date of rebuild.

#### NOTE

**Missile batteries are required to be inspected and tested as specified in appendix B.**

*c. Shelf Life.* The shelf life of missile batteries is given in the chart below:

#### NOTE

All activities engaged in the receipt, storage, and issue of USACECOM missile batteries (FSC 6135) are not to issue a battery having less than 2 years shelf life remaining. These batteries are overage. For each overage battery, fill out and forward Standard Form 120 (Report of Excess Personal Property) to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, NJ 07703. After receipt of the Standard Form 120, disposition instructions will be forwarded to the originator of the form within 30 days.

TYPE	SHELF LIFE
B-415	5 years
BA-472C/U	14 years
BA-485A/U	12 years
BA-286A/U	Indefinite
BA-287/U	Indefinite
BA-605/U	Indefinite

TYPE	SHELF LIFE
BA-617/U	12 years
BA-618/U	5 years
BA-627/U	1 year
BA-628/U	1 year
BA-629/U	5 years
BA-630/U	5 years

## APPENDIX A REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms	TM 11-6625-654-14	Operator's Organizational, Direct Support and General Support Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List) for Multi-meter AN/USM-223 (NSN 6625-00-999-7465).
MIL-STD-109	Quality Assurance Terms and Definitions		
MIL-STD-129	Marking for Shipment and Storage		
MIL-STD-726	Packaging Requirements Code		
TM 116625-585-12P	Operator and Organizational Maintenance Repair Parts and Special Tools Lists and Maintenance Allocation Chart Ammeter ME-65A/U (NSN 6625-00-985-5251).	TM 38-750	The Army Maintenance Management System (TAMMS).
		TM 743-200-1	Storage and Materials Handling.

## APPENDIX B STORAGE QUALITY ASSURANCE PROVISIONS

### B-1. National Stock Number.

Each item listed in this bulletin with its National stock number, is subject to the provisions of this SQAP.

### B-2. Definitions.

Special terms used in this SQAP are defined as follows:

*a. Acceptance Quality Level (AQL).* The nominal value expressed in terms of percent defective or defects per 100 units, whichever is applicable, specified for a given group of defects of a product. It is the maximum allowable accidental departure from specification requirements which can be tolerated.

*b. Storage Quality Level (SQL).* That quality level applicable to storage sampling inspection expressed in terms of percent defective or defects per 100 units, whichever is applicable, specified for a given group of defects of a product. It is the maximum allowable accidental departure from specification requirements which can be tolerated.

*c. Defects.* Any nonconformance of the unit of product with specified requirements.

*d. Defective Unit.* A unit of product which contains one or more defects.

*e. Critical Defect.* A defect that judgement and experience indicate is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending on the product performance of the tactical

function of a major end item, such as a shop, aircraft, tank, missile, or space vehicle.

*f. Major Defect.* A defect other than critical that could result in failure, or materially reduce the usability of the product for its intended purpose.

*g. Minor Defect.* A defect that does not materially reduce the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

*h. Mechanical-Visual Inspection.* An inspection by visual means to observe the item and/or packaging and packing to detect deficiencies. Mechanical-visual inspection may require disassembly.

*i. Technical Inspection.* A complete functional inspection, including disassembly, where required, and performance testing and/or laboratory testing.

### B-3. Specifications, Technical Manuals, and Other Documents

The following documents, of the latest issue in effect, contain inspection and testing information, data, and instructions applicable to these quality assurance provisions:



<i>Publication</i>	<i>Title</i>
DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
AR 725-50	Requisitioning, Receipt, and Issue System.
MIL-P-116H MIL-P-11268K	Preservation, Methods of. Parts, Materials and Processes Used in Electronic Communication Equipment.
MIL-M-13231A MIL-STD- 105D	Marking of Electronic Items. Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-109B	Quality Assurance Terms and Definitions.
MIL-STD-129H	Marking for Shipment and Storage.
MIL-STD-130E	Identification Marking of U.S. Military Property.
MIL-STD-252B	Wired Equipment, Classification of Visual and Mechanical Defects for.
MIL-STD-726F	Packaging Requirements Code.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB-SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TB 750-236	Calibration Requirements for the Maintenance of Army Materiel.
TM 38-750	Army Equipment Record Procedures.

#### **B-4. Other Directives.**

<i>Publication</i>	<i>Title</i>
AR 795-17	General Policies and Principles for Furnishing Army Materiel on a Grant Aid Basis.
AR 795-204	General Policies and Principles for Furnishing Defense Articles and Services on a Sale or Loan Basis.

#### **B-5. Inspection Criteria.**

##### *a. Lot Criteria.*

(1) *Lot definition.* A lot is defined as a group of like items from which sample is to be drawn and inspected to determine conformance with the acceptability criteria. The following are examples:

(a) A group of like items in storage which were received in a shipment with the following identical markings:

1. Purchase order number.
2. Date packaged or packed.

3. Depot certification stamp and data.

(b) A group of like items repaired or rebuilt by the Maintenance Division in one production run.

(2) *Lot formation.* The items shall be assembled into identifiable lots. Each lot shall, as far as practicable, consist of units of product of a single type, grade, class, size, and composition manufactured, repaired, or rebuilt at the same time and stored under the same conditions.

(3) *Lot size.* The lot size is the total number of individual like items in the lot that is to be inspected.

b. *Sampling Procedure.*

(1) *Sample selection.* Select samples of material in a way which will assure that each unit in the lot has an equal chance of being selected. Biased methods, such as selecting items from the same position in a container, pallets, or stacks; taking items all from one location; or selecting items that appear defective, will not be used.

(2) *Sample size.* Use table I of MIL-STD-105D, General Inspection Level II, to obtain the sample size code letter, and table II-A of MIL-STD-105D to obtain the sample size using the storage quality levels shown in (3) below.

(3) *Storage quality levels (SQL).*

(a) *Mechanical-visual inspection:* critical SQL 1.0 percent; major SQL 2.5 percent; minor SQL 10 percent.

(b) *Electrical:* critical SQL 1.0 percent, major SQL 2.5 percent.

(c) *Preservation, packaging, packing, and marking:* major SQL 4.0 percent; minor SQL 10 percent.

(d) The acceptance or reject number for the above SQL's shall be the same as those shown for comparable acceptance quality levels (AQL's) in table II-A of MILSTD-105D.

(c) *Inspection Requirements.* The following mechanical-visual inspections shall be performed: (1) Inspect case for physical damage, condition, and finish.

(2) Inspect all controls and switches for proper operation and loose or missing hardware.

(3) Inspect all connectors, plugs, and cord receptacles for condition and damage.

(4) Inspect assembly for physical damage, condition, missing parts, foreign objects, and finish.

(5) Inspect cabling and wiring for potential short circuits, cuts, breaks, fraying, deterioration, kinks, and strain.

(6) Inspect solder connections for missing solder, cold solder, insufficient solder, excessive solder, and improper wrap.

(7) Inspect for illegible, incorrect, or missing markings.

(8) Inspect for corrosion, dirt, moisture, and fungus.

(9) Inspect all parts and hardware for damage and condition.

d. *Test Requirements.* Perform those tests that are specified for each missile battery listed in appendix B.

*c. Defect Classification.*

(1) Mechanical-Visual.

(a) *Critical.* Refer to the definition of a critical defect.

(b) *Major.*

1. Damage due to handling or storage (crushed, deformed, or broken).

2. Soldering: defects as listed in MILSTD-252D.

3. Solderless connectors: defects as listed in MIL-STD-252B.

4. Cabling and wiring: defects as listed in MILSTD-252B.

5. Hardware: defects as listed in MILSTD-252B.

6. Foreign objects: defects as listed in MILSTD-252B.

7. Potential short circuits: defects as listed in MIL-STD-252B.

8. Finish: defects as listed in MIL-STD-252B.

9. Marking: defects as listed in MIL-STD-252B.

10. Parts: defects as listed in MIL-STD-252B.

11. Contacts: defects as listed in MILSTD-252B.

12. Plating, painting or MFP missing.

13. Dimensional: a dimensional defect which directly affects interchangeability, assembly or operation.

(c.) *Minor.*

1. Soldering: defects as listed in MILSTD-252B.

2. Solderless connectors: defects as listed in MIL-STD-252B.

3. Cabling and wiring: defects as listed in MILSTD-252B.

4. Hardware: defects as listed in MILSTD-252B.

5. Finish: defects as listed in MIL-STD-252B.

6. Marking: defects as listed in MIL-STD-252B.

7. Parts: defects as listed in MIL-STD-252B.

8. Contacts: defects as listed in MIL-STD-252B.

(2) *Electrical.*

(a) *Critical.* Refer to the definition of a critical defect.

(b) *Major.* Any electrical defect, other than critical, that does not meet the requirements specified for each item shall be considered a major defect.

(c) *Minor.* None. All electrical defects shall be considered critical or major, as applicable.

(3) *Packaging and marking, major.*

(a) Use of improper or defective material.

(b) Quantity in unit package not as specified.

(c) Incorrect packaging method applied.

(d) Cushioning or padding omitted.

(e) Cushioning or padding inadequate for the protection of the barrier material from projections, sharp edges, or other similar features of the item.

(f) Cushioning inadequate for the physical and mechanical protection of the item.

(g) Unsealed, punctured, or improperly sealed barrier bag, wrap, or envelope.

(h) Stock number omitted, incorrect, or illegible.

(i) Nomenclature omitted, incorrect, or illegible.

(j) Marking of quantity of items in package omitted, incorrect, or illegible.

(k) Different stock numbered items in the same unit package.

(4) *Packaging and marking, minor.*

(a) Item not properly blocked or braced within the unit package to prevent movement.

(b) Packaging material damaged.

(c) Conforming or cushioning wraps are not snug fitting and contain voids.

(d) Air not expelled from barrier prior to sealing.

(e) Any item of marking information other than (3) (h), (i), and (l) above listed under major defects omitted, incorrect, or illegible.

(5) *Packing and marking, major.*

(a) Use of improper or defective material.

(b) Quantity in pack not as specified.

(c) Gross weight in excess of specified amount.

(d) Box closure not as specified.

(e) Type, grade, class, and style of the shipping container not as specified.

(f) Strapping omitted (when required).

(g) Strapping inadequate or incorrectly applied (when required).

(h) Items not adequately blocked, bracketed, or cushioned within the shipping container to prevent movement or damage.

(i) Shipping documents or packing list omitted.

(j) Stock number omitted, incorrect, or illegible.

(k) Nomenclature omitted, incorrect, or illegible.

(l) Marking of quantities of items in pack omitted, incorrect, or illegible.

(m) Destination marking omitted, incorrect, or illegible.

(n) Special marking or labeling (when required) omitted, incorrect, or illegible.

(o) Overseas code marking (when required) omitted, incorrect, or illegible.

(6) *Packing and marking, minor.*

(a) Unsealed carton.

(b) Defective taping or sealing of carton.

(c) Any other box defect which may be considered minor by definition of MIL-STD-105.

(d) Any item or required marking information other than (5) (U) through (o) above listed under major defect omitted, incorrect or illegible.

*f. Calibration of Measuring and Testing Equipment.*

All measuring and test equipment shall have been calibrated and certified within its prescribed period, in accordance with TB 750-236 before use. Certification shall be affixed in such a way as to preclude any altering or tampering.

*g. Storage Inspection Records.* Results of inspections and tests shall be recorded on data sheets and a copy attached to each unit.

**B-6. Inspection Frequency.**

- a. Controlled humidity warehouse: 60 months.
- b. Heated warehouse: 36 months.
- c. Unheated warehouse: 18 months.

**B-7. Type of Storage**

Controlled humidity warehouse, heated, warehouse, or unheated warehouse.

**B-8. Other Instructions.**

*a. Rejected Lots.* Each rejected lot shall be tagged and reclassified into the proper condition code in accordance with AR 725-50. For other than raw material, all defective units in a lot shall be repaired, or disposition requested in accordance with AMC and depot procedures.

*b. Repackaging of Samples Inspected.* Restore the packaging of the samples inspected and accepted to the level of the lot from which the samples were drawn.

By Order of the Secretary of the Army:

JOHN A. WICKHAM JR.  
*General, United States Army*  
*Chief of Staff*

Official:

ROBERT M. JOYCE  
*Major General, United States Army*  
*The Adjutant General*

**DISTRIBUTION:**

To be distributed in accordance with DA Form 12-32, Organizational Maintenance requirements for Nike Hercules Improved Missile System and Pershing Missile System.



## THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

- 1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
- 1 Meter = 100 Centimeters = 1.000 Millimeters = 39.37 Inches
- 1 Kilometer = 1.000 Meters = 0.621 Miles

### SQUARE MEASURE

- 1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
- 1 Sq Meter = 10.000 Sq Centimeters = 10.76 Sq Feet
- 1 Sq Kilometer = 1.000.000 Sq Meters = 0.386 Sq Miles

### CUBIC MEASURE

- 1 Cu Centimeter = 1.000 Cu Millimeters = 0.06 Cu Inches
- 1 Cu Meter = 1.000.000 Cu Centimeters = 35.31 Cu Feet

### LIQUID MEASURE

- 1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
- 1 Liter = 1.000 Milliliters = 33.82 Fluid Ounces

### TEMPERATURE

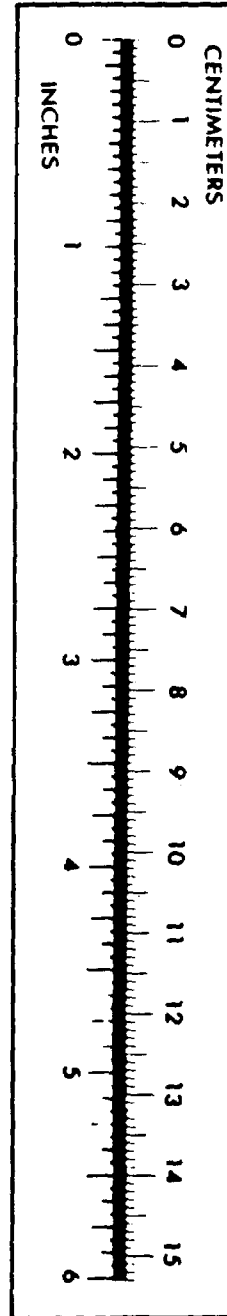
- $5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
- 212 $^{\circ}$  Fahrenheit is equivalent to 100 $^{\circ}$  Celsius
- 90 $^{\circ}$  Fahrenheit is equivalent to 32.2 $^{\circ}$  Celsius
- 32 $^{\circ}$  Fahrenheit is equivalent to 0 $^{\circ}$  Celsius
- $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

### WEIGHTS

- 1 Gram = 0.001 Kilograms = 1.000 Milligrams = 0.035 Ounces
- 1 Kilogram = 1.000 Grams = 2.2 lb.
- 1 Metric Ton = 1.000 Kilograms = 1 Megagram = 1.1 Short Tons

### APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609
TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



## THE METRIC SYSTEM AND EQUIVALENTS

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Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
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Ounces	Grams	28.349
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Short Tons	Metric Tons	0.907
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