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DEVELOPMENT SPECIFICATION
FOR A
28-VOLT BATTERY

MARCH 3, 1958

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Document Change #1
Insertion Page 2a
May 9, 1958

Listing of Pages Effective with Document Change #1

The following is a list of the page numbers and respective issue dates which are effective with Document Change #1 of this specification.

An issue date is not shown on any page of original issue.

<u>Page No.</u>	<u>Issue Date</u>
1	Original
2	Original
2a	May 9, 1958
3	Original
4	May 9, 1958
5	Original
6	Original
7	Original
8	Original
9	Original

Changes from previous issue are flagged with an asterisk in the left margin on each page.

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DEVELOPMENT SPECIFICATION
FOR A
28-VOLT BATTERY

1 PURPOSE AND CLASSIFICATION

- 1.1 This specification defines the physical and functional requirements for a nominal 28-volt battery.
- 1.2 The term unit used herein shall mean the 28-volt battery.
- 1.3 The security classification of materials, processes, and drawings will be assigned by the AEC.

2 APPLICABLE SPECIFICATIONS, OTHER PUBLICATIONS, AND DRAWINGS

2.1 Applicable Specifications. -- Revisions are noted in parentheses.

<u>Federal Specifications</u>	<u>Custodian</u>
QQ-S-00640 Steel, carbon: sheet	Fed
QQ-P-416(1) Plating, cadmium (electrodeposited)	Fed

2.2 Other Publications. -- The latest issues of the following publications form a part of this specification to the extent indicated in the text:

<u>Publication</u>	<u>Custodian</u>
USAF Specification Bulletin No. 23 Material and Process Specification	USAF

2.3 Drawings. -- The latest issues of the following drawings form a part of this specification to the extent indicated in the text:

Sandia Corporation Drawings

Drawing 400137: Identification, Major Components and Ancillary Equipment

2.4 Ordering Information. -- Copies of the specification and publications listed below.

<u>Custodian symbol</u>	<u>Name of custodian</u>	<u>Address of custodian</u>
USAF	Air Force	Commanding General, Wright Air Development Center Attn: WCXP Wright-Patterson Air Force Base Dayton, Ohio

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<u>Custodian</u> <u>symbol</u>	<u>Name of</u> <u>custodian</u>	<u>Address of</u> <u>custodian</u>
Federal	Federal	General Service Administration Regional Office Building 7th and D Streets, S.W. Washington 25, D.C.

3 REQUIREMENTS

3.1 Precedence

3.1.1 Precedence of this Specification and Related Documents. -- Wherever their requirements are in conflict, this specification and related documents shall take precedence in the following order:

- a. The contract
- b. This specification
- c. Sandia Corporation drawings
- d. Applicable specifications and standards

3.2 General. -- Any material or process not covered herein shall conform with a specification listed in USAF Specification No. 23. If the specifications listed in Bulletin No. 23 are not applicable, the material or process shall be selected in accordance with the order of precedence established by ANA Bulletin No. 143. Any standard part not covered herein shall be chosen to comply with specifications and standards selected in the order of precedence set forth in ANA Bulletin No. 143.

3.3 General Design. -- The contractor shall design the unit subject to the requirements of this specification. This specification is detailed only to the extent considered necessary to obtain the desired mechanical, electrical, and performance characteristics and ensure the reliability of these characteristics. The design, layout, and assembly of the unit shall be such as to facilitate quantity production. Plating specifications noted in Section 2 shall be used where required for operation or protection of the unit.

*3.3.1 Performance. -- The unit shall satisfy performance requirements when tested to:

- a. Steady load of 17 ohms
- b. Initial load of 2 ohms removed at 24 volts
- c. Two pulsed loads applied at 100 seconds
 - (1) 2-ohm load for 100 milliseconds
 - (2) 7-ohm load for 2 seconds

The pulse limit is 20 volts, and life shall be 150 seconds, measured to 24 volts. With a maximum voltage of 32 volts, the maximum rise time of the battery shall not exceed 5 seconds.

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3.3.2 Environmental Conditions. -- The assembly shall be designed to function as specified in 3.3.1, during and after subjection to the conditions defined in 3.3.2.

3.3.2.1 Temperature. -- Any temperature between -65° and 165° F.

3.3.2.2 Vibration. -- Vibrations in any direction at any temperature between -65° and $+165^{\circ}$ F in accordance with the following table (Reference SCS-7):

<u>Frequency range</u> (cps)	<u>Constant acceleration</u> <u>or double amplitude</u>
3.0 to 4.5	1.0 inch
4.5 to 23.0	1.0g
23.0 to 73.7	0.036 inch
73.7 to 500.0	10.0g

3.3.2.3 Shock. -- The longitudinal (two directions) and transverse shock requirements are as follows:

	<u>Longitudinal</u>	<u>Transverse</u>
Rise time	1 msec	2 msec
Peak value	2000g	2000g
Decay to plateau	10 msec	5 msec
Plateau value	500g	500g
Duration of plateau	40 msec	10 msec

3.3.2.4 Storage. -- Storage at temperature of $+165^{\circ}$ F for 48 hours prior to storage at any temperature between -80° and $+125^{\circ}$ F for ten years.

3.3.2.5 Acceleration. -- Accelerations of 50g at any temperature between -65° and $+160^{\circ}$ F in any direction along each of the three mutually perpendicular axes of the component for a period of one minute in the unactivated condition and a period of 5 seconds in the activated condition.

3.3.2.6 Case and Cover. -- Hermetically sealed case and cover per Drawing 141559 and 141441, respectively.

3.3.2.7 Activator. -- The unit shall be activated by two Atlas electric low-energy matches. The matches will be electrically isolated from the cell stacks; in addition, they should be so placed that if there is probability of electrical leakage between the matches and the cell stacks, it will be to the negative end of the cell stacks.

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4 TESTS

4.1 General

4.1.1 Test Facilities. -- Test equipment shall have accuracies commensurate with specified tolerances. Test chambers shall have a volume of at least twice that of the unit being tested therein and shall be arranged so that a minimum of radiant heat or circulating air impinges directly on the unit. The units shall be tested at the specified temperatures under normal atmospheric conditions, unless otherwise specified.

4.1.2 Tolerances on Environmental Conditions. -- Unless otherwise specified, environmental test conditions shall be held within the following limits:

Vibration tolerance:

Amplitude: ± 5 per cent
 Frequency: ± 2 per cent

Temperature: $\pm 5^{\circ}\text{F}$

4.1.3 Test Records. -- Records shall be made of all specified measurements. These records shall be made available to Sandia Corporation upon request.

4.2 Basic Tests. -- The actual tests and performance required during or after these tests to determine conformance to the performance requirements of this specification shall be determined during the development period to the mutual satisfaction of Sandia Corporation and the contractor. The tests as defined will then be included in this section.

4.2.1 100 Per Cent Tests. -- This group of tests will be performed on all units and shall be of such nature as to determine functional ability of the product. These tests shall be nondestructive.

4.2.1.1 Dielectric Tests. -- A voltage of 500 ± 50 volts DC shall be applied to each of the terminals, the can being grounded. The leakage current shall not exceed 45 microamperes.

4.2.2 Function. -- The unit shall be activated by means of the enclosed matches and output voltage measured across loads specified in 3.3.1.

4.2.3 Destructive Tests. -- The supplier shall make such destructive tests as are necessary for the development of the unit. These test results shall be available to Sandia Corporation upon request.

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4.2.3.1 Low Temperature. -- The unit shall be stabilized at -65°F and, while at that temperature, the unit shall be activated and meet the requirements of 4.2.2.

4.2.3.2 High Temperature. -- The unit shall be stabilized at $+160^{\circ}\text{F}$ and, while at that temperature, the unit shall be activated and meet the requirements of 4.2.2.

4.2.3.3 Vibration Unactivated. -- The unit shall be mounted in such a manner as to simulate service installation. The temperature of the unit shall be stabilized before beginning tests. At the conclusion of these tests, visual inspection of the unit shall reveal no damage which might ultimately result in malfunction. The unit shall be operated in accordance with 4.2.1 and 4.2.2 following completion of the test.

4.2.3.3.1 Resonance

4.2.3.3.1.1 Survey. -- Resonant conditions (frequency, amplitude, axis, and temperature) shall be determined by vibrating the unit along each of three mutually perpendicular axes at room temperature, at -65°F , and at 165°F through a range of frequencies from 3 to 500 to 3 cps varied slowly at the following double amplitudes or accelerations:

<u>Frequency range (cps)</u>	<u>Constant acceleration or double amplitude</u>
3.0 to 4.5	1.0 inch
4.5 to 23.0	1g
23.0 to 73.7	0.036 inch
73.7 to 500.0	10g

4.2.3.3.1.2 Vibration at Resonance. -- The unit shall be vibrated at each resonant condition observed in 4.2.3.3.1.1. The period of vibration shall be 60 minutes for resonance occurring at room temperature and 15 minutes for resonances occurring at -65° or -160°F . If along one axis, the period of vibration as specified above for this temperature may be divided among the different frequencies or used to cover the frequency which caused the most severe resonance. The method considered most likely to produce failure should be selected.

4.2.3.3.2 Cycling. -- The unit shall be vibrated through a frequency range of 10 to 500 to 10 cps in 15-minute cycles at an applied double amplitude of 0.036 inch in the frequency range of 10 to 75 cps and an applied constant acceleration of 10g in the 75- to 500-cps range. Vibration shall be applied along each of three mutually perpendicular axes for one hour at room temperature, 15 minutes at -65°F , and 15 minutes at $+165^{\circ}\text{F}$.

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4.2.3.4 Shock Unactivated. -- The unit shall be tested per 3.3.2.3, shock requirement along three mutually perpendicular axes. At the conclusion of these tests, visual inspection of the unit shall reveal no damage which might ultimately result in malfunction. The unit shall be operated in accordance with 4.2.1 and 4.2.2 following completion of the test.

4.2.3.5 Shock Activated. -- The unit shall be tested per 3.3.2.3 shock requirements, 25 seconds after activation signal on any one of the three mutually perpendicular axes.

5 PREPARATION FOR DELIVERY

5.1 Packaging. -- The unit shall be packaged to prevent damage in shipment by common carrier and ensure delivery in such condition as to conform with all of the requirements of this specification.

NOTICE: When government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the part that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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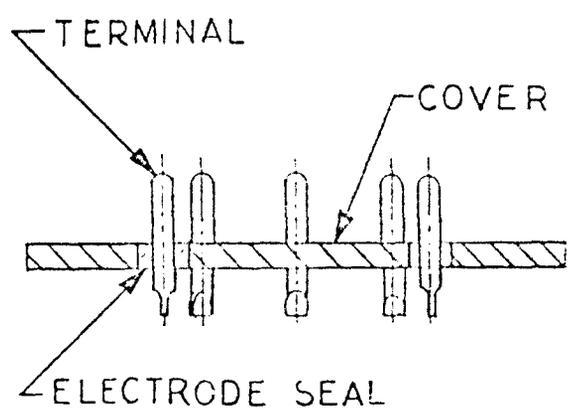
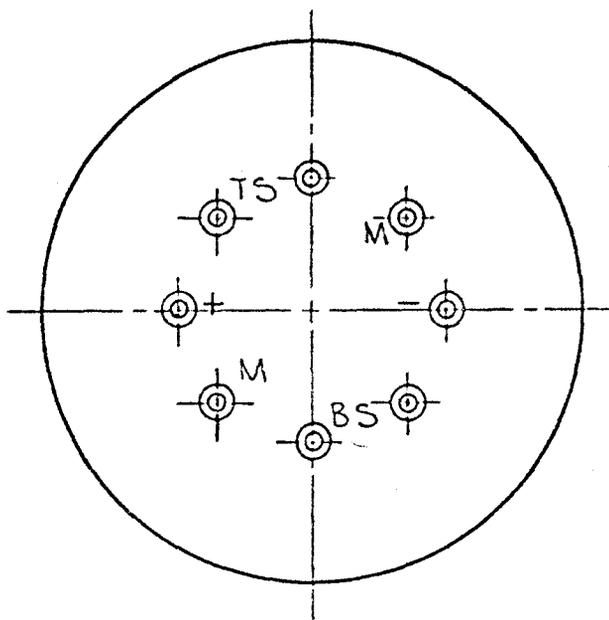


FIGURE 1

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