

MIL-R-81839 (AS)

28 March 1977

MILITARY SPECIFICATION

RACK, BOMB, AIRCRAFT; BRU-12/A

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification establishes the requirements for the manufacture and inspection of one type of bomb rack capable of carrying and releasing 22.68 kilogram (50 pound) to 657.71 kilogram (1,450 pound) stores having suspension lugs spaced 355.6 millimeters (14 inches) apart. The test limits in this specification define minimum acceptable capabilities.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

MIL-T-7743	Testing, Store Suspension and Release Equipment; General Specification for
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MIL-H-85042	Hooks, Bomb Rack, General Specification for
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Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to:

ENGINEERING SPECIFICATIONS AND STANDARDS DEPARTMENT (CODE 93) NAVAL AIR ENGINEERING CENTER, LAKEHURST, N.J. 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 1095

MIL-R-81839(AS)**STANDARDS****Military**

MIL-STD-100	Engineering Drawing Practices
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-704	Electric Power, Aircraft, Characteristics and Utilization of
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
MIL-STD-831	Test Reports, Preparation of
MS3314	Lug, Suspension, 453.6 kg. (1,000 lb) class, Airborne Equipment

DRAWINGS**Naval Air Systems Command**

DL909AS100	Data List, Test Fixture, BRU-12, 14, 15 and AERO 1A Adapter
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(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Order of precedence of specifications and standards. Should a conflict exist between any requirement in this specification and any requirement in the applicable documents referenced herein, the requirements of this specification shall take precedence over the referenced (applicable) document.

3. REQUIREMENTS

3.1 First article. The bomb rack furnished under this specification shall be a product which has been inspected and passed the first article inspection specified herein (see 4.3).

3.2 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.3 Interchangeability. All parts having the same part number shall be directly and completely interchangeable with each other with respect to installation and performance.

3.4 Identification of parts. All parts shall be marked as specified on the drawings listed in the data list for the bomb rack being procured, or in accordance with MIL-STD-130, if not specified on the drawings. The item identification and part number requirements of MIL-STD-100 shall govern the part number and changes thereto.

MIL-R-81839(AS)**3.5 Bomb rack.**

3.5.1 Construction. The construction of the bomb rack shall be in accordance with the drawings listed in the data list for the bomb rack being procured and as specified herein (see 6.2.1f).

3.5.2 Performance. The bomb rack shall satisfy all performance requirements when subjected to the following inspections in the order specified in Tables I and II.

- a. Electromechanical Component Inspection (see 4.6.1)
- b. Bomb Rack Inspection (see 4.6.2)
- c. Functional Test (see 4.6.3)
- d. Arming Mechanism (see 4.6.4)
- e. Electrical Characteristics (see 4.6.5a)
- f. Lag Determination (see 4.6.5b)
- g. High-g Release (see 4.6.5c)
- h. Sand (see 4.6.5d)
- i. Salt Spray (see 4.6.5e)
- j. Shock (see 4.6.5f)
- k. Vibration (see 4.6.5g)
- l. Life (see 4.6.5h)
- m. Static (see 4.6.5i)

3.6 Bomb rack hooks. The construction and inspection of the bomb rack hooks shall be in accordance with MIL-H-85042.

3.7 Workmanship. The workmanship displayed in fabrication and assembly of the bomb rack shall be such as to assure, within design limitations, the ability of the bomb rack to meet performance requirements under all applicable environmental conditions specified herein. Unauthorized repair, welding, heavy burrs, or parts assembled by introduction of high stresses not prescribed in the drawings, are typical signs of inferior workmanship and shall be cause for rejection. The standards of workmanship exhibited in the approved first article sample, subject to any qualification stated in the government's notice of approval, shall be determinative of the requirements of the contract relative to workmanship.

4. QUALITY ASSURANCE PROVISIONS (see 6.4)

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise

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specified in the contract, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in the specification, where such inspections are deemed necessary to assure that the supplies and services conform to prescribed requirements.

4.2 Classification of inspection. The inspection of the bomb rack shall be classified as follows:

- a. First article inspection (see 4.3)
- b. Quality conformance inspection (see 4.4)

4.3 First article inspection. First article inspection shall consist of all of the inspections listed in Table I. First article inspection report format shall be in accordance with MIL-STD-831 (see 6.3).

TABLE I
FIRST ARTICLE INSPECTIONS - SCHEDULE AND SEQUENCE ^{1/}

TESTS	TEST PARAGRAPH	SAMPLE	
		A	B
Electromechanical Component Inspection	4.6.1	See ^{2/}	
Bomb Rack Inspection	4.6.2	1	1
Functional	4.6.3	2	2
Arming Mechanism	4.6.4	3	3
Electrical Characteristics	4.6.5a	X	4
Lag Determination	4.6.5b	4	X
High-g Release	4.6.5c	X	5
Sand	4.6.5d	5	X
Salt Spray	4.6.5e	6	X
Shock	4.6.5f	X	6
Vibration	4.6.5g	X	7
Life	4.6.5h	7	X
Static	4.6.5i	X	8

^{1/} Inspection sequence is denoted by the numbers in the sample columns. An X denotes inspection not required.

^{2/} This requirement is applicable to all bomb rack inspections with the exception of arming mechanisms.

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4.3.1 Sampling for first article inspection. First article bomb rack samples shall consist of the first two bomb racks manufactured on contract. The bomb racks shall be permanently labeled A and B for ease of identification. Failure of the bomb racks to pass any of the first article inspections shall be cause for rejection (see 6.3).

TABLE II

QUALITY CONFORMANCE INSPECTIONS - SCHEDULE AND SEQUENCE^{1/}

TESTS	TEST PARAGRAPH	SAMPLE			
GROUP 1		All Samples			
Electromechanical Component Inspection	4.6.1	See ^{2/}			
Bomb Rack Inspection	4.6.2	1			
Functional	4.6.3	2			
Arming Mechanism	4.6.4	3			
GROUP 2		A	B	C	D
Electrical Characteristics	4.6.5a	X	1	X	1
Lag Determination	4.6.5b	1	X	X	X
High-g Release	4.6.5c	X	2	X	2
Sand	4.6.5d	2	X	X	X
Salt Spray	4.6.5e	3	X	1	X
Shock	4.6.5f	X	3	X	X
Vibration	4.6.5g	X	4	X	X
Life	4.6.5h	4	X	2	X
Static	4.6.5i	X	5	X	3

^{1/} Inspection sequence is denoted by the numbers in the sample columns. An X denotes inspection not required.

^{2/} This requirement is applicable to all bomb rack inspections with the exception of arming mechanisms.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the following inspections:

- a. Individual Inspections (see 4.4.1)
- b. Sampling Inspections (see 4.4.2)

Quality conformance inspection report format shall be in accordance with MIL-STD-831 (see 6.3).

4.4.1 Individual inspections. Individual inspections are those inspections conducted on each bomb rack. Individual inspections for the bomb racks are shown in Table II, Group 1. Failure to pass any of these inspections shall be cause for rejection of the bomb rack.

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4.4.2 Sampling inspections. A random sampling of the bomb racks shall be selected by the procuring activity from each production lot in accordance with Table III and shall be subjected to the inspections listed in Table II, Group 1 and Group 2. Group 1 inspections shall be conducted prior to Group 2 inspections. Failure to pass any of these inspections shall be cause for rejection of the entire lot (see 6.3).

TABLE III
SAMPLING TEST ITEMS

ITEM	PRODUCTION LOT SIZE	NUMBER OF SAMPLES
Bomb Racks	100 or Less	2
	101 - 200	3
	201 - 300	4
	301 or More	1/

1/ The procuring activity shall specify the number of samples, and the sequence of inspections each unit shall be subjected to for lots in excess of 300 units (see 6.2.1e).

4.5 Inspection conditions. Unless otherwise specified, all inspections shall be performed under the following conditions:

- a. Room temperature. Room ambient of $25 \pm 10^{\circ}\text{C}$ ($77 \pm 18^{\circ}\text{F}$) indicated.
- b. Test temperature. All parts of the test item shall be stabilized at the specified temperature $\pm 2.8^{\circ}\text{C}$ ($\pm 5^{\circ}\text{F}$) indicated prior to conducting any tests. Unless otherwise specified, temperature stabilization will have been attained when the indicated temperature of the surface of the largest mass of the test item does not change by more than $\pm 2.8^{\circ}\text{C}$ ($\pm 5^{\circ}\text{F}$) in a period of 1 hour.
- c. Test fixture. Whenever tests require that a store be mounted to a bomb rack, a fixture shall be utilized which is in accordance with DL909AS100. All swaybrace adjustments shall be in accordance with this data list. This configuration is for test purposes only.
- d. Test stores. Unless otherwise specified in the applicable paragraph, the lightest store shall be 45.81 kilograms (101 pounds) and the heaviest store shall be 657.71 kilograms (1,450 pounds). The stores shall conform to the following parameters: All store suspension lugs shall be in accordance with MS3314 and shall be spaced 355.6 millimeters (14 inches) apart. The 45.81 kilogram (101 pound) store shall have a center of gravity located midway between the suspension lugs and 139.7 millimeters (5 1/2 inches) below the hook bearing surface of each suspension lug. The other stores shall have centers of gravity located midway between the suspension lugs and 203.2 millimeters (8 inches) below the hook bearing surface of each suspension lug.
- e. Input power requirements. The bomb rack shall perform satisfactorily under all applicable conditions specified herein from a 28 VDC rated voltage power source with characteristics and limits as defined in MIL-STD-704, except that the bomb rack shall operate over a range of 20 to 30 VDC, measured at the bomb rack's input connector(s).

MIL-R-81839(AS)**4.6 Inspection methods.**

4.6.1 Electromechanical component inspection. The following inspections shall be made during (when applicable) and after each of the inspections conducted on the bomb rack, as specified in Tables I and II, with the exception of 4.6.4.

4.6.1.1 Bomb rack operation. Proper operation of the cocked indicator and transfer switches of the Actuator, Linear, Electromechanical, hereinafter referred to as the LEMA, shall be verified in accordance with 4.6.3.1e. The voltage shall be as specified in the applicable inspection.

4.6.2 Bomb rack inspection. The bomb rack shall be inspected as follows:

4.6.2.1 Individual inspections. Each bomb rack shall be inspected to ensure that it has been properly assembled and adjusted, that the electrical connections are secure and that the workmanship is as specified herein (see 3.7).

4.6.2.2 First article and quality conformance inspections.

- a. Each bomb rack shall be thoroughly examined to determine conformance to all of the requirements specified herein (see 3.5.1).
- b. The bomb racks shall be examined to ascertain that the packaging conforms to the contract requirements (see 5).

4.6.3 Functional test.

4.6.3.1 Bomb rack. The following test shall be performed on each bomb rack in the sequence listed.

- a. With the bomb rack unloaded, cock the LEMA and linkage assembly and latch the hooks. Verify that there is free play between the bell crank and LEMA and that the linkage assembly is properly cocked and the hooks securely latched.
- b. Insert the latch check pin assembly, hereinafter referred to as the safety pin, in the safety pin hole.
- c. Manually attempt to move the bell crank forward. The hooks shall remain securely cocked and latched.
- d. Recock the linkage assembly, if necessary.
- e. Apply rated voltage to the LEMA. The LEMA shall uncock but its cocked indicator switch shall remain closed. Remove the rated voltage. The cocked indicator switch shall open. No current shall flow through the transfer switch until re-application of rated voltage. The linkage assembly and hooks shall remain securely latched.
- f. Cock the LEMA and linkage assembly, if necessary.
- g. Remove the safety pin from the safety pin hole.

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- h. Manually move the bell crank forward to release. Both hooks shall fully open.
- i. Repeat a.
- j. Apply rated voltage to the LEMA. Both hooks shall open fully. The LEMA shall function as in e.
- k. Cock the LEMA and linkage assembly. The hooks shall remain open. Verify that there is free play between the bell crank and LEMA and that the linkage assembly is properly cocked.
- l. Insert the safety pin in the safety pin hole.
- m. Latch a 657.71 kilogram (1,450 pound) store to the bomb rack, latching the hooks securely. The store and swaybrace loads (15,346 N (3,450 pounds) total vertical down load, midway between the hooks) may be simulated using hydraulic rams, or similar methods, if approved by the procuring activity.
- n. Remove the safety pin and release the load by applying rated voltage to the LEMA. Repeat 4.6.1.1.
- o. Repeat i. through n.

4.6.4 Arming mechanism. A MK-9 or MK-11 bomb arming wire assembly shall be inserted in the tail and nose arming units of the bomb rack. With each arming unit unenergized, pull each arming wire slowly, in a vertically downward direction, parallel to the side of the bomb rack. Each arming unit shall support a 40.03 N (9 pound) load, but release the wire at any load in excess of 57.83 N (13 pounds). A minimum of three successive measurements shall be obtained on each unenergized arming unit. With each arming unit energized, pull on each arming wire in the same direction as specified above. Each arming unit shall support a load of 667.23 N (150 pounds).

4.6.5 Additional tests. The bomb rack shall pass the following tests of MIL-T-7743 as specified, except as modified herein. The arming units shall meet the requirements of 4.6.4 when they are required to be tested, and they shall be tested in the vertically downward direction only. The requirements of 4.6.1 shall be checked during (if feasible) and after each of the listed tests.

- a. Electrical Characteristics (see 4.6.5.1)
- b. Lag Determination (see 4.6.5.2)
- c. High-g Release (see 4.6.5.3)
- d. Sand Test (see 4.6.5.4)
- e. Salt Spray (see 4.6.5.5)
- f. Shock Test (see 4.6.5.6)
- g. Vibration Test (see 4.6.5.7)
- h. Life Test (see 4.6.5.8)
- i. Static Test (see 4.6.5.9)

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4.6.5.1 Electrical characteristics. The minimum operating voltage shall be determined by demonstrating that all electrical equipment on the bomb rack operates when 20 VDC is applied to the terminals of the applicable bomb rack connector.

4.6.5.2 Lag determination. This test shall be conducted in accordance with the lag or time of release determination test for horizontal bombing (HB) items. A 45.81 kilogram (101 pound) store shall be used for lightest store releases and a 657.72 kilogram (1,450 pound) store shall be used for heaviest store releases.

4.6.5.3 High-g release. This test shall be conducted, except that the total vertical down load shall be 35,474.57 N (7,975 pounds).

4.6.5.4 Sand test. This test shall be conducted in accordance with the sand and room temperature portions of the sand test, with the following exceptions:

- a. The force required to arm test shall not apply.
- b. The arming wire pulls, safe setting shall not apply.

4.6.5.5 Salt spray. This test shall be conducted in accordance with the salt spray test with the following changes:

- a. The minimum voltage test shall be as defined in 4.6.5.1.

4.6.5.6 Shock test. This test shall be conducted in accordance with the shock test, with the following changes:

- a. The store shall be released at rated voltage after each shock applied with the bomb rack loaded.
- b. Light load tests shall be conducted using a 45.81 kilogram (101 pound) store as indicated in Table IV.
- c. Yield load shock tests shall be conducted with a 453.6 kilogram (1,000 pound) store. Applied shock amplitudes for the yield load shall be based on the limit shock loads given in Table IV. Yield shock loads are 1.15 times the values shown in Table IV.

4.6.5.7 Vibration. This test shall be conducted in accordance with the vibration test, Procedure I, except that the frequency range shall be 5-2000 Hz. The input amplitude of vibration shall be 0.508 millimeters (0.020 inches) D.A. or ± 2.6 g's, whichever is less, for a store weight of 453.6 kilograms (1,000 pounds).

4.6.5.8 Life test. This test shall be conducted in accordance with the life test for nonexplosive items.

4.6.5.9 Static load tests. This test shall be conducted in accordance with the static tests except that the bomb rack shall be loaded to limit, yield and ultimate loads. The failure load test shall not be conducted. Yield loads shall be 1.15 times and ultimate loads 1.5 times the limit loads given in Table V. The loads shall be applied to a rigid simulated store of negligible weight (90.72 kilograms, 200 pounds maximum), swaybraced in accordance with 4.5c. All loads and moments shall act at a point midway between the hooks and 203.2 millimeters (8 inches) below the lug bearing surfaces.

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TABLE IV
APPLIED SHOCK LOADS

DIRECTION	APPLIED SHOCK LIGHT LOAD (g's) FOR 45.81 KG. (101 LB.) STORE	APPLIED SHOCK LIMIT LOAD (g's) FOR 453.6 KG. (1,000 LB.) STORE
Vertical Down	25	7.33
Vertical Up	25	3.67
Longitudinal Forward	25	6.60
Longitudinal Aft	25	6.60
Transverse Port	25	4.80
Transverse Starboard	25	4.80

TABLE V
STATIC TEST LIMIT LOADS

Condition	Px Longitudinal	Py Side	Pz Vertical	Myy Pitch Moment	Mzz Yaw Moment
1	+15,702.22 N (+3,530 Lbs.)	+19,216.32 N (+4,320 Lbs.)	-22,107.66 N (-4,970 Lbs.)	-8,383.47 N.m (-74,200 Inch-Lbs.)	+9,321.25 N.m (+82,500 Inch-Lbs.)
2	+40,034.00 N (+9,000 Lbs.)	+6,672.33 N (+1,500 Lbs.)	-13,344.67 N (-3,000 Lbs.)	+1,898.14 N.m (+16,800 Inch-Lbs.)	+632.71 N.m (+5,600 Inch-Lbs.)
3	-40,034.00 N (-9,000 Lbs.)	+6,672.33 N (+1,500 Lbs.)	-13,344.67 N (-3,000 Lbs.)	+1,898.14 N.m (+16,800 Inch-Lbs.)	+949.07 N.m (+8,400 Inch-Lbs.)
SIGN CONVENTION					
+Px = Longitudinal Aft +Py = Side to Port +Pz = Vertical Up +Myy = Pitch Nose Up +Mzz = Yaw Nose to Port					

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5. PACKAGING

5.1 Bomb rack preservation and packaging. Preservation and packaging shall be in accordance with Level A, B or C as specified in MIL-STD-794, as specified in the contract, without the use of preservation compound.

5.2 Packing. Shipping containers shall contain one each packaged bomb rack. The container shall be suitable for Level A, B or C as specified in MIL-STD-794.

5.3 Unitized loading. Unitized loading for the bomb racks is authorized as specified in MIL-STD-794.

5.4 Marking. All shipping containers shall be marked in accordance with the requirements of MIL-STD-129 with the following information:

RACK, BOMB, AIRCRAFT BRU-12/A
 MILITARY SPECIFICATION NO. MIL-R-81839(AS)
 PRESERVED (DATE)
 DOMESTIC OR EXPORT PACKED (AS APPLICABLE)
 GOVERNMENT ORDER NO. (OR CONTRACT NO. IF ORDER NO. IS
 NOT ASSIGNED)
 NAME OF SUPPLIER (AND NAME OF MANUFACTURER IF NOT THE
 SAME)
 MANUFACTURER'S CODE IDENTIFICATION NUMBER

6. NOTES

6.1 Intended use. The bomb rack covered by this specification is intended for use in level bombing and glide bombing. It is mounted either externally, as in an aircraft wing pylon, or internally, as in a bomb bay. It is intended for use on either land-based or carrier-based aircraft.

6.2 Ordering data. Procurement documents shall specify the following.

6.2.1 Procurement requirements.

- a. Title, number and date of this specification.
- b. Selection of applicable levels of preservation, packaging and packing required (see 5.1 and 5.2).
- c. Samples subjected to sampling inspection shall not be considered or accepted as part of the contract (see 4.4.2).
- d. Sampling inspection selection (see 4.4.2).
- e. Number of samples and inspection sequence for production lots in excess of 300 units (see Table III).
- f. Applicable drawing package (see 3.5.1).

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- g. Name and location of government representative responsible for random selection of inspection samples (see 4.4.2).
- h. Items of data required (see 6.3).
- i. Name and location of government approved test laboratory.

6.2.2 Contract provision. Contracts shall specify the following provision for first article inspection.

6.2.2.1 First article. When a first article is required for inspection and approval (see 3.1, 4.3, 6.2 and 6.3), the contract shall specify the following provision for first article inspection. When a contractor is in continuous production of bomb racks from contract to contract, consideration should be given to waive the first article inspections. If inspection is required, indicate:

- a. If first article inspections are conducted at the contractor's plant or a government approved laboratory, an inspection report shall be forwarded to the procuring activity for verification.
- b. That the approval of first article samples or the waiving of the first article inspection shall not relieve the contractor of his obligation to fulfill all other requirements of the specification and contract.

6.3 Contract data requirements. When this specification is used in a procurement which incorporates a DD Form 1423 and invokes the provisions of 7-104.9(n) of the Armed Services Procurement Regulations, the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (DD Form 1423) incorporated into the contract. When the provisions of ASPR-7-104.9(n) are not invoked, the data specified below will be delivered by the contractor in accordance with the contract requirements. Deliverable data required by this specification is cited in the following paragraphs:

Paragraph	Data Requirement	Applicable DID
4.3	First Article Inspection Reports	DI-T-5329 - Inspection Test Reports
4.4	Quality Conformance Inspection Reports	DI-T-5329 - Inspection Test Reports

(Copies of data item descriptions required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

6.4 Quality assurance definitions. Definitions for quality assurance terms are in accordance with MIL-STD-109.

Preparing Activity

NAVY-AS

DOD Proj. No. 1095 - N072

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