NOTICE OF CHANGE

INCH-POUND
MIL-HDBK-255A(AS)
NOTICE 1
9 September 1993

MILITARY HANDBOOK

NUCLEAR WEAPONS SYSTEMS, SAFETY, DESIGN, AND EVALUATION CRITERIA FOR

TO ALL HOLDERS OF MIL-HDBK-255A(AS):

1. THE FOLLOWING PAGES OF MIL-HDBK-255A(AS) HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
3		3	6 September 1984
4		4	6 September 1984
5		5	6 September 1984
6		6	6 September 1984
7		7	6 September 1984
8	6 September 1984	8	REPRINTED WITHOUT CHANGE
27		27	6 September 1984
28		28	6 September 1984
39		39	6 September 1984
40		40	6 September 1984

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-HDBK-255A(AS) will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military handbook is completely revised or cancelled.

Preparing activity:
Navy - AS

(Project NUOR-N003)

AMSC N/A

FSC NUOR

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

MILITARY

MIL-E-6051	Electromagnetic Compatibility Requirements for Systems
MIL-M-8090	Mobility, Towed Aerospace Ground Equipment, General Requirements for
MIL-T-25959	Tie Downs, Cargo, Aircraft
MIL-C-38999	Connector, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for

STANDARDS

MILITARY

MIL-STD-209	Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment
MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-462	Electromagnetic Interference Characteristics, Measurement of
MIL-STD-648	Design Criteria for Specialized Shipping Containers
MIL-STD-882	System Safety Program Requirements
MIL-STD-1366	Transportability Criteria
MIL-STD-1512	Electroexplosive Subsystems, Electrically Initiated, Design Requirements and Test Methods
MIL-STD-1553	Aircraft Internal Time Division Command/Response Multiplex Data Bus
MIL-STD-1791	Designing for Internal Aerial Delivery in Fixed Wing Aircraft
DOD-STD-2167	Defense System Software Development

HANDBOOKS

MILITARY

MIL-HDBK-5	Metallic Materials and Elements for Aerospace Vehicle Structures

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from DODSSP - Customer Service, Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 1911-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent herein. Unless otherwise specified, the issues are those cited in the solicitation.

DOD 5210.41	Security Policy for Protecting Nuclear Weapons
DOD 7935.1	DOD Automated Information Systems
OD 44942	Weapon System Safety Guidelines Handbook

(Copies of DOD 5210.41 and DOD 7935.1 may be obtained from the Naval Data Automation Command, Code 172, Washington DC 20374 or the National Technical Information Services (NTIS), Alexandria, VA 22181. Copies of OD 44942 may be obtained from the Aviation Supply Office, Code 03443, 5801 Tabor Avenue, Philadelphia, PA 19120-5099).

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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Supersedes page 6 of 6 September 1984.

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Supersedes page 8 of 6 September 1984.

6. NUCLEAR WEAPON SYSTEM AUTOMATA

6.1 General. The design criteria outined in this section apply to automata which receive, store, process or transmit data to prearm, arm, enable, unlock, fire, launch, or release a nuclear weapon. Such equipment shall be designed to provide the highest degree of protection against accidental or unauthorized activation of critical command and control functions.

6.2 Automata design criteria.

6.2.1 Software design and development. All system software, including any support software and test maintenance software, shall be designed and coded using structured design techniques and structured programming techniques, and shall be in complete conformance to DOD-STD-2167.

6.2.2 Module coupling. The software shall be broken down into independent compilable modules which are completely uncoupled or if coupling is necessary, only the lowest levels of coupling shall be used; i.e., data coupling and common coupling.

6.2.3 Documentation. The software requirements, design, and implementation shall be documented as early as possible and shall comply with the documentation requirements of DOD-STD-2167 (Navy) and Department of Defense Automated Information Systems DOD 7935.1. All documentation shall be updated to reflect changes and progress throughout the life cycle.

6.2.4 Critical function commands. Any critical function commands issued or controlled by software such as prearming, arming, releasing, firing, and safing commands shall be designed to preclude inadvertent and accidental generation of these commands from complementary bit patterns or from unexpected or uncontrollable bit errors in the command word or data stream. Techniques such as Longitudinal Redundancy Checks (LRC) and Cyclic Redundancy Checks (CRD) may be used for disk type periphorals. Double error checks and correction techniques for memory devices and non-linear check summing techniques shall be used where appropriate.

6.2.5 Program loading. The system shall be designed to prevent automatic control until all valid and correct program data have been loaded and verified. If the operator controls the loading, a method will be provided to halt the loading if any error occurs and prevents use of the data if proper loading is not verified.

6.2.6. Memory data change. Once the memory has been loaded and verified, the data shall be protected from unauthorized or accidental change. Memory change due to hardware failure shall be minimized to the maximum extent possible. A single hardware fault must not result in a memory change involving critical functions. Reloading or changing the memory critical contents shall require a method for proper entry to the memory. Any attempt to gain access to memory to load or change it without the proper discriminatory means for entry shall cause a positive indication to the weapon system operator or maintenance crew and the automata entry will be automatically rejected. If selected computer software routines are stored at manned control centers for future transfer to unmanned weapon system facilities by the communication system, a method must be devised to ensure that routines have been transferred correctly. A method must also be devised to prevent unauthorized or inadvertent data transfers by anyone who has access to the communication system.

6.2.7 Memory security. The system shall be designed to preclude unwarranted/unauthorized recovery of classified information from its memory. System elements shall be classified at a level commensurate with the highest level of classified information content. A method will be provided to permit downgrading of the classified contents of the memory pertaining to nuclear safety. The method must preclude meaningful data retrieval without the use of specialized, nonportable laboratory equipment. System operating instructions must specify that if this security measure is ineffective, memory units will be classified at the highest category of the information processed.

6.2.8 Control. Automata which contain nuclear weapon system critical logic will be designed so that a deviation from proper routine or sequence will automatically result in a recycle to the proper sequence or a self-test mode. If this requirement cannot be met, an automatic shutdown with an associated signal to the operator will be provided.

8. NONCOMBAT DELIVERY VEHICLES AND SUPPORT EQUIPMENT

8.1 General. Safety must be incorporated into the design of noncombat transport vehicles and support equipment used to move, store, load, and unload nuclear weapons. The safety design factors must allow for the uncertainties in predicting operational conditions, variations in material strengths and in manufacturing, and uncertainties introduced by simplified design procedures. These criteria supplement good industrial design practices, standards and features, and are not intended to prohibit the use of any commercial design off-the-shelf vehicle or equipment procured for nonnuclear purposes (such as trucks, truck tractors, semitrailers, trailers, cranes, hoists, winches, and so forth) which meet these criteria. The equipment must meet appropriate structural, environmental, and mobility requirements. The applicable STS will define modes of transportation. All equipment must be designed to operate under conditions described in the operational concept or logistic sequence for the equipment or the major system.

8.1.1 Ground transportation equipment. This equipment shall be designed so that the nuclear weapon is not supported by the lift arms, cables, or hydraulic systems, but is supported by the basic frame of the equipment. (This does not apply to equipment used solely for positioning or transferring nuclear weapons in a designated area.)

a. Static grounding provisions must be considered for equipment designed for specific nuclear weapon systems.

b. The equipment shall be designed so that it will reduce the transmission of fire (electrical or fuel system failure) or shock to the nuclear weapon(s).

c. Equipment that will carry nuclear weapons and will be transported by an auxiliary vehicle during air and ground operations shall be designed so that the nuclear weapon is not supported by the transport equipment lift arms, cable, hydraulic systems. The weapon shall be supported by the basic frame of the equipment or the auxiliary ground transport vehicle structure.

8.1.2 Structural design. This structural design applies to weapon loaders, forklift, trailers, and self-propelled ground vehicles used to transport nuclear weapons in its basic structures. (Refer to paragraph 8.11 for design considerations of commercial vehicles.)

a. Rated load. The rated load is that load combination of forces (weapon and/or supporting equipment) that the basic equipment must support or resist in a static condition. This load is the nuclear certified load.

b. Design loads. Design loads for each axis shall be based on the total static rated load multiplied by a factor of three or on the dynamic load multiplied by a factor or two, whichever is greater. To determine if the dynamic design load will exceed the static design load, the designer must consider lateral, horizontal, and vertical dynamic loads, acceleration encountered during ground transport environments, and shock loads associated with mate, domate, load, and unload operations. The design load shall be the minimum load for meeting the design stress.

c. Design stress levels. In determining allowable stresses for equipment, select the material and type stress specified in Government publications and nationally recognized standards, such as MIL-HDBK-5, American Society of Testing Materials (ASTM), and Society of Automotive Engineers (SAE). The combined stress level of the three axes shall be below the yield point.

8.2 Cargo aircraft systems. Applicable noncombat delivery vehicles and support equipment as wsll as cargo aircraft carrying nuclear weapons must be designed to meet the aerial delivery requirements in MIL-STD-1791, and the internal/external cargo handling requirements of the specified aircraft detail specification.

8.2.1 Cargo aircraft tiedowns. Nuclear cargo tiedown configurations shall:

a. Not impose reaction loads that exceed the strength of aircraft tiedown rings identified in the appropriate cargo aircraft .

b. Provide for only one tiedown device to one aircraft tiedown ring.