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MILITARY SPECIFICATION

INSTALLATION OF DROPPABLE STORES AND ASSOCIATED RELEASE SYSTEMS

This specification is approved for use within 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 and testing procedures for aircraft droppable store (see 6.4.8) installations and associated release systems. Excluded from this specification are the installation requirements for aircraft pyrotechnics and forward firing rockets.

1.2 Classification. This specification applies to two types of aircraft installations:

a. External installations: Installations in which the stores are completely or partially exposed to relative wind impingement during flight.

b. Internal installations: Installations in which the stores are internally mounted within the aircraft.

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 (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Warfare Center Aircraft Division Lakehurst, Systems Requirements Department, Code SR3, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1095

SPECIFICATIONS

MILITARY

MIL-K-3926	Knobs, Control (For Use with Electronic, Communications, and Allied Equipment).
MIL-B-5087	Bonding, Electrical, and Lighting Protection, for Aerospace Systems.
MIL-W-5088	Wiring, Aerospace Vehicle.
MIL-E-5400	Electronic Equipment, Aerospace, General Specification for.
MIL-E-6051	Electromagnetic Compatibility Requirements, Systems.
MIL-C-6781	Control Panel: Aircraft Equipment, Rack or Console Mounted.
MIL-E-7080	Electric Equipment, Aircraft, Selection and Installation of.
MIL-T-7743	Testing, Store Suspension and Release Equipment, General Specification for.
MIL-A-8591	Airborne Stores, Suspension Equipment and Aircraft-Store Interface (Carriage Phase); General Design Criteria for.
MIL-F-8785	Flying Qualities of Piloted Airplanes.
MIL-D-18300	Design Data Requirements for Avionic Equipment.
MIL-C-29600	Connectors, Electrical, Circular, Miniature, Composite, High Density, Quick Coupling, Environment Resistant, Removable Crimp Contacts, Associated Hardware General Specification for.
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.
MIL-C-81774	Control Panel, Aircraft General Requirements for.
MIL-C-85485	Cable, Electric, Filter Line, Radio Frequency Absorptive.

STANDARDS

MILITARY

MIL-STD-100	Engineering Drawing Practices
MIL-STD-454	Standard General Requirements for Electronic Equipment.
MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
MIL-STD-781	Reliability Design Qualification and Production Acceptance Tests: Exponential Distribution.
MIL-STD-810	Environmental Test Methods and Engineering Guidelines.
MIL-STD-882	System Safety Program Requirements.

STANDARDS

MILITARY

MIL-STD-889	Dissimilar Metals.
MIL-STD-1377	Effectiveness of Cable, Connector and Weapon Enclosure Shielding and Filters in Precluding Hazards of Electromagnetic Radiation to Ordnance; Measurement of.
MIL-STD-1385	Preclusion of Ordnance Hazards in Electromagnetic Fields; General Requirements for.
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.
MIL-STD-1553	Aircraft Internal Time Division Command/Response Multiplex Data Bus.
MIL-STD-1757	Lightning Qualification Test Techniques for Aerospace Vehicles and Hardware.
MIL-STD-1760	Aircraft/Store Electrical Interconnection System.
MIL-STD-2088	Bomb Rack Unit (BRU), Aircraft, General Design Criteria for.
MIL-STD-2131	Launcher, Ejection, Guided Missile, Aircraft, General Design Criteria for.
MIL-STD-2156	Launcher, Rail, Guided Missile, Aircraft, General Design Criteria for.
MIL-STD-45662	Calibration Systems Requirements.

HANDBOOKS

MILITARY

MIL-HDBK-5	Metallic Materials and Elements for Aerospace Vehicle Structures.
MIL-HDBK-235-1	Electromagnetic (Radiated) Environment Considerations for Design and Procurement of Electrical and Electronic Equipment, Subsystems and Systems.
MIL-HDBK-237	Electromagnetic Compatibility Management Guide for Platforms, Systems and Equipment.
MIL-HDBK-244	Guide to Aircraft/Stores Compatibility.
MIL-HDBK-255	Nuclear Weapons Systems, Safety, Design and Evaluation Criteria for.
MIL-HDBK-300	Technical Information File of Support Equipment.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from DODSSP - CUSTOMER SERVICE Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

PUBLICATIONS

Naval Air Systems Command (NAVAIR)

SD-24	General Specification for Design and Construction of Aircraft Weapon Systems.
11-140-24	Airborne Weapons Support Equipment, Description and Characteristics.
11-140-25	Armament Weapons Support Equipment Configuration.
19-1-127	Non-Avionics Preferred Common Support Equipment.
19-15BD-6	Single Hoist Ordnance Loading System (SHOLS).
19-100-2	Airborne Weapons Handling Equipment.
NACSIM 5100	Compromising Emanations, Laboratory Test Requirements, Electromagnetics.
AOP-12 Volume 1	Aircraft Stores Interface Manual (ASIM) Aircraft Manual.
AOP-12 Volume 3	Aircraft Stores Interface Manual (ASIM) Suspension Equipment.

Naval Sea Systems Command (NAVSEA)

OD 30393	Design Principles and Practices for Controlling Hazards of Electromagnetic Radiation to Ordnance.
OP 2173	Approved Handling Equipment for Weapons and Explosives.

(Copies of SD-24 are available from the Naval Air Systems Command, Standardization Section, Code AIR 51122E, 1421 Jefferson Davis Hwy, Arlington, VA 22243-5110. Copies of 19-1-127, 19-15BD-6, and 19-100-2 are available from the Naval Air Systems Command, Technical Manuals Library, Code 5004, 1421 Jefferson Davis HWY, Arlington, VA 22243-5004. Copies of 11-140-24, 11-140-25, OD 30393, and OP 2173 are available from the Navy Aviation Supply Office, Code 03443, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. Copies of NACSIM 5100 are available from the Naval Electronics Systems Security Engineering Center (Code 04), Washington, D.C. 20393-5270. AOP-12 is published by the the Naval Air Warfare Center Weapons Division, Maintenance Engineering Branch, Code 2021, Point Mugu, CA 93042-5000.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated detail specifications. The individual item requirements shall be as specified herein and in accordance with the associated detail specification. In the event of any conflict between the requirements of this specification and the associated detail specification, the latter shall

govern. (If a specific requirement specified herein is not required for an item, it shall be so indicated on the associated detail specification.)

3.2 Materials. The materials required for the installations specified herein shall conform to requirements in the applicable detail specification, SD-24, applicable sections of MIL-STD-2088, MIL-STD-2131, and MIL-STD-2156. General design information governing usage of metals is furnished in MIL-HDBK-5.

3.2.1 Dissimilar metals. When dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided in accordance with the requirements of MIL-STD-889.

3.3 Equipment. Control, release, and handling equipment (see 6.4.12) shall be included in the aircraft store (see 6.4.1) and release equipment (see 6.4.23) to provide for the proper and safe loading/downloading (see 6.4.16), suspension, and release (see 6.4.21) of all droppable stores specified in the applicable aircraft detail specification or as otherwise required. General requirements and guidance for design of suspension and release equipment are provided in MIL-STD-2131, MIL-STD-2156, MIL-HDBK-244, MIL-HDBK-255, and MIL-STD-2088. Store installations shall utilize existing common support equipment listed in MIL-HDBK-300 or as specified in the aircraft detail specification.

3.3.1 Release control equipment. The number and types of release control (see 6.4.22) systems and bomb bay door control systems (see 6.4.5) shall be as specified herein (see 3.17 and 3.20). The number and type of Government-furnished and contractor-furnished equipment to be installed in any particular model aircraft shall be as required in SD-24 or the applicable aircraft detail specification. Government-furnished equipment shall be installed or provisions for installation shall be provided as required (see 6.1.3). All other equipment necessary for the proper operation of the store suspension and release systems and the bomb bay door control systems shall be installed as required.

3.3.2 Contractor-furnished equipment. If neither Government-furnished equipment nor approved contractor-furnished equipment is specified in the aircraft detail specification, the contractor may procure or manufacture the required equipment. Design (if applicable) of all aircraft equipment shall be compatible with the above requirements including SD-24, MIL-HDBK-5, MIL-STD-2088, MIL-STD-2131, MIL-STD-2156 and MIL-HDBK-255. The acquiring activity approval shall be obtained for each contractor-furnished equipment prior to its installation in the aircraft.

3.4 Store loads. The droppable store installation in each aircraft shall provide for accommodation of the store loads specified in the applicable aircraft detail specification and contractual requirements.

3.5 Location of store loads. Store installations shall provide for the proper location of the required store loads in or on the aircraft with respect to the aircraft center of gravity. The center of gravity of the store load shall be located as close as possible to the center of gravity of the aircraft

so that the release of store(s) and consequent decrease in load shall not have any adverse effect on or disturb the steady or stable flight of the aircraft. Sequential release or launching (see 6.4.15) of stores shall not affect or limit the aircraft performance. Requirements of MIL-F-8785 shall be met for all store configurations. Stores and their suspension and release equipment shall be located to ensure that clean and satisfactory separation from the aircraft occurs under all specified flight conditions.

3.6 Strength requirements. Strength shall be provided in the aircraft interface for droppable stores and carry-through structures consistent with the strength of the aircraft structure for all combinations of translational and rotational velocities and accelerations for which the strength requirements of the aircraft contract detail specification require that the aircraft be designed. The design ultimate and design yield factors of safety shall be as specified in the applicable aircraft detail specification and MIL-A-8591.

3.7 Alignment of stores. Store installations shall facilitate the proper alignment of the various types of droppable stores which the aircraft is required to carry (see 3.4).

3.8 Ease of rearming (see 6.4.20). Store installations shall facilitate efficient and safe handling, adjustment, and controlling of all the required stores under all loading and operating conditions expected to be encountered by the applicable aircraft in service ashore and afloat.

3.8.1 Rearming instructions. Determination of the most efficient procedure for rearming the aircraft shall be made in accordance with 4.3.3 (see 6.3).

3.8.2 Rearming time. The time required for rearming the aircraft (including full required store loads and ammunition loads) in accordance with the instructions required in 3.8.1 shall be determined based on an acceptable rearming procedure test (see 4.3.3).

3.8.3 Installation conversion. When store loads specified in the applicable aircraft detail specification necessitate the interchange, addition, or removal of armament systems components to effect the various armament capabilities of the aircraft, such component interchange, addition, or removal to the extent possible consistent with other aircraft design parameters shall be minimized.

3.8.4 Conversion time. The installation conversion time shall not exceed one man-hour per aircraft. The time required for reconfiguring the aircraft from one armament capability to another shall be defined as the installation conversion time. This time shall consist of the total of the times required to reconfigure the suspension, release, monitor, control, and fuzing equipment of the aircraft in the process of converting the aircraft to its various armament capabilities. The installation conversion time is independent of, and computed separately from, the rearming time specified in 3.8.2. In computing installation conversion time, reconfigurations shall be performed by a single crew, without special tools or equipment other than items which will be available to operational military crews performing similar functions.

3.9 Clearance. Minimum clearances shall be provided in the store installation in the aircraft (see 3.9.1 through 3.9.3.2).

3.9.1 Clearance, external and internal installations. Clearance, applicable to both external and internal installations, shall be provided (see 3.9.1.1 through 3.9.1.5).

3.9.1.1 Clearance for loading. Clearance shall be provided to enable movement of the largest required store into a position directly below the appropriate release equipment when the aircraft is fully serviced and is in its normal attitude on the normal landing surface. For the purpose of determining this required clearance, use of appropriate handling equipment listed in NAVAIR 19-1-127, NAVAIR 19-100-2, MIL-HDBK-300, and NAVSEA OP 2173, Volumes 1 and 2, shall be assumed unless specific equipment is designated by the acquiring activity for use with the store and aircraft. For minimum clearance between the bomb rack (see 6.4.6) lower surface and the store upper surface, see MIL-A-8591, figures 4, 5, and 6, 1/.

3.9.1.2 Drop clearance. Clearance shall be provided to prevent contact between each store and between any of the stores and all neighboring parts of the aircraft when the store is dropped or launched under all operating conditions and release attitudes encountered by the aircraft. Ejection mechanisms shall be installed, if necessary, to provide this clearance.

3.9.1.3 Propeller disc clearance. On propeller aircraft, provision shall be made to ensure a clearance of not less than 12 inches between the propeller discs and the released store during store separation from the aircraft.

3.9.1.4 Aerodynamic buffeting clearance. Clearance shall be provided to ensure a minimum of aerodynamic buffeting (see 3.13).

3.9.1.5 Fuze clearance. For stores that ordinarily are made safe by removal of the fuzes, clearance shall be provided to remove or install fuzes on the loaded store without removing the stores from their loaded positions.

3.9.2 Clearance, external installations. The following clearances shall be provided for stores in external installations with the required stores mounted on the release equipment and ready to be launched or released. (Clearance data, where applicable, may be furnished in the Aircraft Stores Interface Manual (see AOP-12 Volumes 1 and 3).)

3.9.2.1 Minimum ground clearance. Clearance between the lowest extremity of the largest required store and the ground or deck shall be not less than 6 inches in accordance with requirements of SD-24 or as specified in the applicable aircraft detail specification.

3.9.2.2 Flight control surface clearance. Clearance between all required stores and all flight control surfaces of the aircraft, such as flaps, dive breaks, ailerons, and elevators, shall be not less than 1 inch with the surfaces in a position of maximum deflection.

3.9.2.3 Heating control flap clearance. Clearance between all required stores and the adequate cooling or heating control flaps shall be not less than 1 inch, with flaps in a position of maximum deflection.

3.9.2.4 Catapult bridle clearance. On aircraft provided with catapult fittings, the clearance between all required stores and the catapult bridle fittings shall prevent interference between the bridle and the stores or release equipment during the catapult launching of the aircraft.

3.9.2.5 Intake duct clearance. Any external installation of stores shall provide clearance to preclude the possibility of shock or pressure wave interference from such installation with engine, bleed air, or intake ducts.

3.9.2.6 Engine heat or jet blast clearance. Clearance or insulation shall be provided for stores from engine heat or jet blast. Permissible store temperatures shall be that of the store or stores specified by the applicable aircraft or ordnance specification.

3.9.3 Clearance, internal installations. Internal installations shall be divided into two types: fixed bomb bays, in the sense that stores are mounted on a fixed part of the aircraft structure; and mechanical bomb bays, in the sense that stores are mounted on an operable part of the aircraft structure, which must move relative to the aircraft, to position the stores prior to release. This motion can take the form of either rotation or translation or combinations thereof.

3.9.3.1 Clearance, space envelope below stores in fixed bomb bays. The following clearances shall be provided with the required stores mounted on the release equipment and ready to be released. Except for the closed bomb bay doors and side rails, no part of the aircraft nor any other obstruction, except such as required sway braces and ejection mechanism which are automatically removed from their obstructive positions as each store is released, shall lie within the clearance space envelope bounded by the imaginary plane surfaces defined as:

a. The plane tangent to the uppermost extremity of the largest required store, parallel to the armament datum line and parallel to the pitch axis of the aircraft (acft) (see (a), figure (fig) 1).

b. Two planes tangent respectively to the foremost and rearmost extremities of the largest required store, parallel to the acft pitch axis and 260° and 280° respectively to the armament datum line (see (b) and (c), fig 1).

c. Two planes tangent respectively to the left and right extremities of the largest required store, parallel to the armament datum line and at 260° and 280° respectively to the pitch axis of the acft (see (d) and (e), fig 1).

3.9.3.1.1 Bomb bay door clearance. With the bomb bay doors open, no obstruction, except as noted in 3.9.3.1, shall lie within the space envelope of 3.9.3.1 extended throughout the bay.

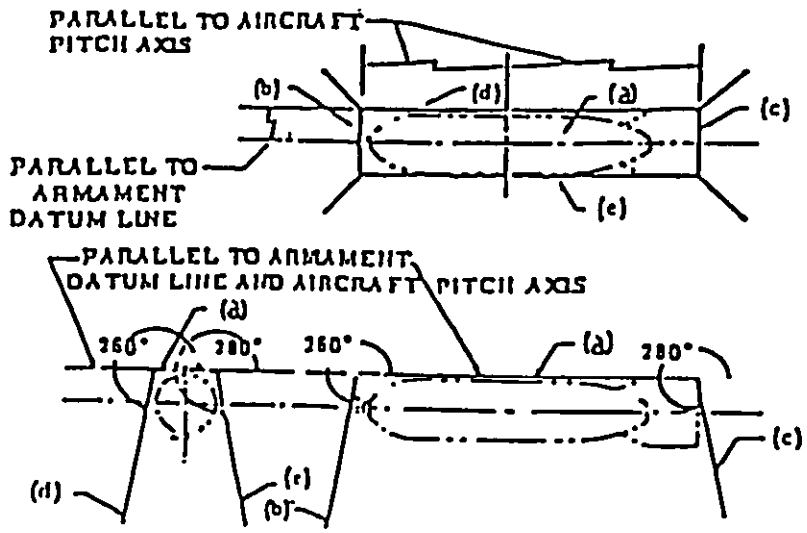

FIGURE 1. Clearance space envelope required below stores.

3.9.3.1.2 Suspension and release equipment clearance. In store installations where the stores are suspended one above the other for sequential release, the suspension and release equipment shall automatically assume a position beyond the limits of the clearance space envelope for the next store above as each store is dropped, and shall cause no obstruction to the subsequently released stores.

3.9.3.2 Clearance, space envelope below stores in mechanical bomb bays. The clearance space envelope below stores in mechanical bomb bays, when the bomb bay is in the ready position preparatory to dropping, shall be not less than that specified for fixed bomb bays in 3.9.3.1.

3.10 Accessibility. Access shall be provided to enable safe and efficient loading of stores in accordance with 3.8, for adjustment and maintenance of the suspension and release equipment, and for the loaded stores. Hand holes or doors shall be provided in the aircraft, if necessary, for this purpose.

3.10.1 Maintenance access. Convenient access shall be provided for checking, cleaning, lubricating, and adjusting all controls, cable ends, solenoids, terminals, release units, lanyard attachments, and other equipment requiring maintenance.

3.10.2 Access for store adjustment. Access shall be provided to enable operation of the necessary hand tools required for making proper adjustments on store fittings, such as torpedo stop valves, when the stores are mounted on the release equipment.

3.11 Reliability. The reliability to be provided in the integrated aircraft weapon system and its subsystems shall be in accordance with reliability appendix of the detail specification. The specified values of reliability shall not result in a net operational reliability incompatible

with the effective accomplishment of the missions specified or with the planned service life of the aircraft and its subsystems.

3.12 Maintainability. The maintainability of the aircraft weapon system and its subsystems shall be in accordance with the maintainability appendix of the detail specification. The maintainability shall result in an availability compatible with effective accomplishment of the missions specified and with the planned service life of the aircraft and its subsystems.

3.12.1 Maintenance checkout provisions. The aircraft and its installed subsystems shall be designed to provide for maintenance checkout when specified in the detail specification. These maintenance checkout capability and maintenance checkout provisions shall be integrated with the basic design of the overall system. The operational checkout capability and maintenance checkout provisions in conjunction with required ground equipment shall provide complete maintenance checkout capability.

3.13 Prevention of buffeting. All available practicable means shall be employed, if applicable, in both external and internal installations to minimize buffeting due to the stores, external sway bracing, pylons, and bomb bay doors. Minimization shall be based on calculations of the Incidence of Buffet made in accordance with MIL-F-8785, and on criteria contained in the most recent issues of relevant National Aeronautics and Space Administration (NASA) and other government publications.

3.14 Store handling provisions. Store installations shall include permanently installed handling provisions, where practicable, to meet requirements of 3.8. Where necessary, suitable brackets and supports, shall be installed or other provisions shall be made for mounting the required portable handling equipment. Such mounting provisions shall be identified at the hoisting station on the aircraft by apparent, permanent marking. If the rearming time and complexity can be reduced by the use of store carriers (see 6.4.26), provisions for the use of such carriers shall be included in the store installation. Store handling provisions shall be made for loading of stores on the foldable sections of the wings while the wings are folded.

3.14.1 Hoisting provisions. Hoisting provisions shall be installed to facilitate the loading of all required stores. If more than one hoisting station is required, the installation shall provide for the use of portable hoists (see 6.4.13) and cables. The store installations shall provide for proper application of existing nonpermanent hoisting adapters, hoisting devices including manual loading equipment, bomb lift trailers, bomb trucks, lift loading adapter, weapons loader (see 6.4.29), and loading carts or trucks as specified in MIL-HDBK-300, NAVAIR 19-1-127, NAVAIR 19-15BD-6, NAVAIR 19-100-2, NAVAIR 11-140-24, and NAVAIR 11-140-25. Hoisting adapters shall not interfere with the operation of stores release equipment. All loading and off-loading or related equipment attachment or installation points shall be clearly marked and identified as to proper usage. For Navy aircraft applications, any store loading attachments or hoisting components shall be capable of withstanding a vertical limit loading of 2.67 g and carrier roll rates of $\pm 20°$ with a 17-second period and pitch of $\pm 3°$ with an 8-second period. The store interface shall be compatible with the controls, load application range, and operational requirements of current applicable U.S. inventory support equipment including the Single Hoist Loading Ordnance Loading System (SHOLS).

3.14.2 Heavy store hoisting. If provisions are required for hoisting stores of 2000 pounds or more each, simultaneous operation of two hoists may be employed. If double hoisting is to be used, the hoist mounting or rigging shall be such that the store is lifted as close to the horizontal axis as possible and that the store lugs are aligned to provide ease of engagement to the bomb rack hooks. Additionally, a minimum amount of lateral force to the store shall be necessary to align the store lugs with the bomb rack hooks as the store is hoisted into its proper position on the release equipment. The prime method for loading with SHOLS is single hoist instead of double hoist. The use of double hoists is an alternative to be used in extreme cases where one hoist cannot be utilized due to inability to pass the hoist cable between rack and store or the store weight exceeds the capacity of the single hoist. When using SHOLS, the lifting capacity of a single hoist, with double-cable reeve, is double the lifting capacity of the hoist used.

3.14.3 Hoisting cable arrangement. Hoisting cable systems shall be arranged so that a minimum number of cable sheaves and fair leads are necessary. Sheaves and fair leads shall be installed to prevent wear on cables. The cable system installation shall be arranged to enable ready replacement of worn cables and fittings. Typical hoisting cable arrangements are shown in figures 2, 3, and 4. If a 1/4 inch diameter cable is utilized, the cable wrap on pulleys shall be not greater than 90°.

3.15 Sway bracing. Sway bracing (see 6.4.27) or other means shall be provided to restrain the store against impact with aircraft and against relative motion with respect to the aircraft. Automatic sway bracing or easily adjustable sway braces shall be provided by the aircraft detail specification where applicable. Sway bracing shall not interfere with release of stores or satisfactory operation under all test conditions of MIL-T-7743 and MIL-STD-810.

3.15.1 Brace areas. The contact area between sway brace pads and the surface of the stores shall prevent structural failure of the store and sway brace assembly itself under loads specified in the applicable aircraft detail specification, and MIL-A-8591.

3.15.2 Sway bracing to external installations. The following requirements are specifically applicable to external store installations.

3.15.2.1 Location of sway braces. Sway braces shall be located in accordance with MIL-A-8591 and MIL-STD-2088 and provide a minimum amount of aerodynamic drag.

3.15.2.2 Rigidity of sway braces. The sway braces in external store installations shall be sufficiently rigid to meet the requirements of 3.6 and to prevent aerodynamic buffeting from occurring due to lack of rigidity between the suspended store and the aircraft (see 3.13).

3.15.3 Sway bracing in internal installations. Additional sway bracing shall be provided if the sway bracing inherent in the suspension equipment, the method of suspension, or the supporting structure in internal installations is structurally (strength and rigidity) inadequate to prevent all movement of the stores which may cause failure of the release system, damage to the store or aircraft, or a hazard to required aircraft operation.

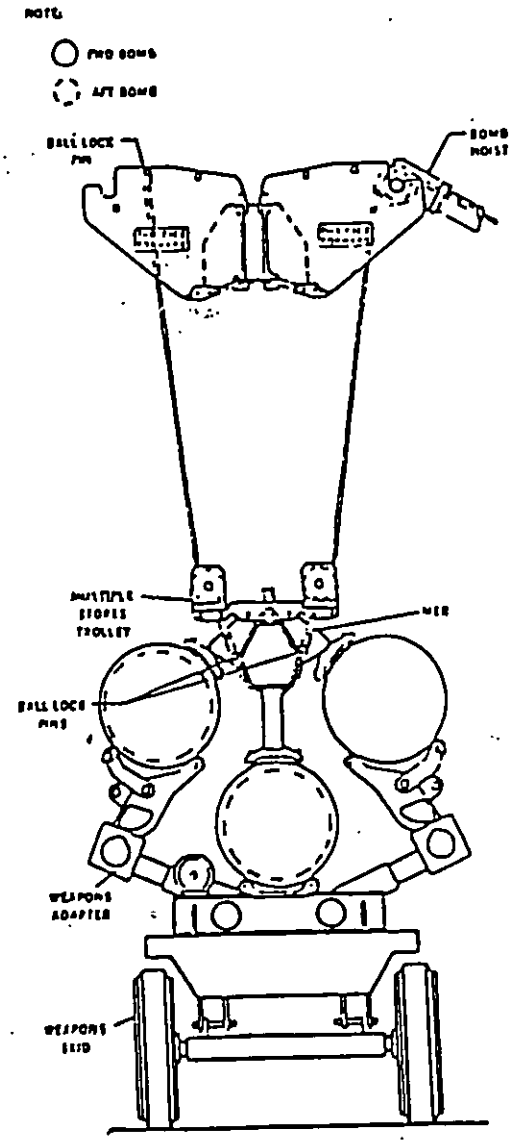

FIGURE 2. General arrangement for loading a longitudinally and transversely unbalanced MER.

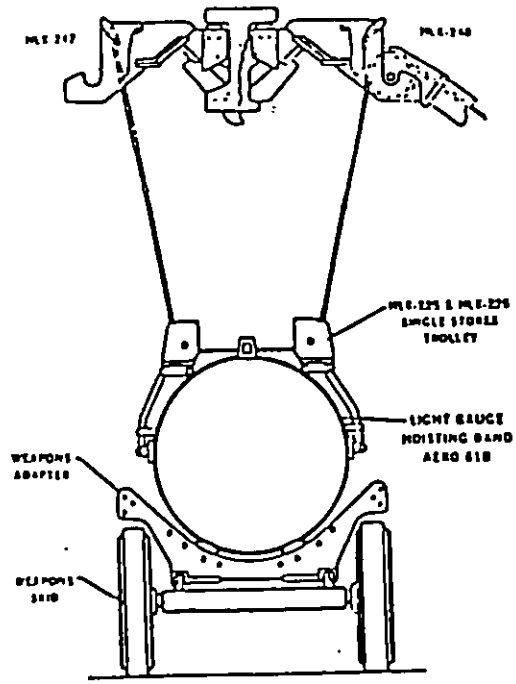

FIGURE 3. General arrangement for loading single store with multiple position hoist adapters.

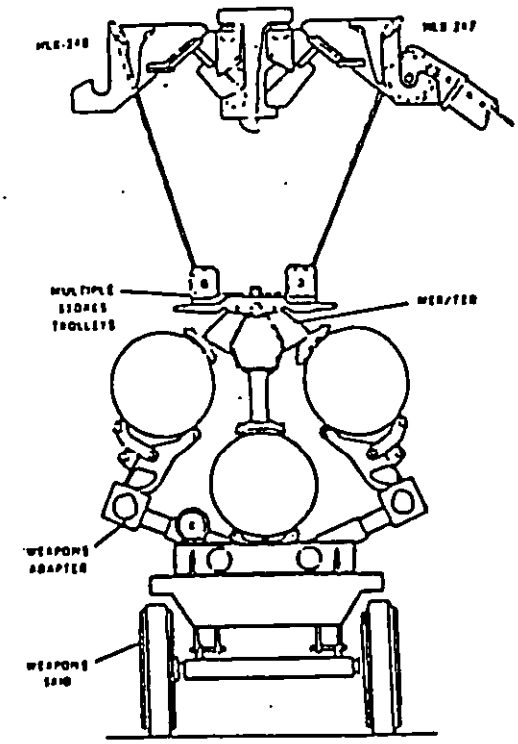

FIGURE 4. General arrangement for loading a balanced MER or TER to Aero 7A ejector rack (TER arrangement shown).

3.16 Ejection mechanism. Ejection mechanism shall be provided (see 3.3, 3.3.1, and 3.3.2) in external installations, when necessary, to ensure adequate clearance between the released store on its trajectory and all sections of the aircraft (see 3.9). The ejection mechanism shall be in accordance with the requirements of MIL-A-8591, MIL-STD-2088, and MIL-STD-2131.

3.16.1 Performance. The ejection mechanism shall provide the necessary performance characteristics to achieve the specified store/aircraft mission along with safe separation (see 6.4.24) during ejection (see 6.4.9) and jettison (see 6.4.14) of the store from the aircraft. The parameters include velocity, acceleration, force, and separation time. The ejection system parameters shall be compatible with the strength characteristics, center of gravity location, and the weight of the store, particularly in the ejector contact area and aircraft interface, to prevent damage to the ejection mechanism, store, or aircraft interface. The operation of the ejection mechanism shall provide the operating parameters under all dynamic and climatic environments of MIL-T-7743.

3.16.2 Design criteria. For design criteria relative to ejection mechanism required to operate during release in flight, see the applicable aircraft detail specification.

3.17 Stores management system (SMS). The carriage, control, and release of all stores shall be through the SMS. The SMS shall comprise a digital computer capable of processing MIL-STD-1553 multiplex data provided from an avionics bus or hardwired data provided by bomb racks, interlocks, pickle buttons, or stores. Stores should provide electrical interface in accordance with MIL-STD-1760. The SMS shall provide for an automatic computer aided store release, controlled from preset programs or a direct/manual release from a pickle button at the pilot's discretion. Operation of the manual store release shall be completely independent of the automatic store release, and the failure of any part of the automatic release system shall not inhibit the operation of manual release. The SMS shall be designed to ensure that neither a pilot switching error nor a single component failure shall cause an inadvertent store release.

3.17.1 SMS operational requirements. The SMS shall be capable of providing or displaying:

a. A visual presentation of weapon/store quantity, type, physical location, status, fuzing option, burst altitude, target altitude, and function select.

b. The status of bomb rack locks, hooks, bomb bay doors, wheels up/down, store heating/cooling, and gyro caging.

c. Controls to enable bomb rack lock/unlock and bomb bay doors open/close, together with the provision that the bomb bay rack may be unlocked only when the bomb bay doors are fully open.

d. Controls to provide master arm power, store arming and fuzing, store operational presets, gyro cage/uncage, video selection, frequency selection, and store heating/cooling. Where the store provides the capability, the SMS shall, upon command, present the

status of all store presets. Upon acceptance by the store of all presets, bomb bay doors open, and the bomb rack unlocked, a store ready for release signal shall be provided.

e. Controls to provide preset delays before release for store requirements such as, gyro uncage, thermal battery energization, fuzing, removal of power from store umbilical cables.

f. Controls to provide sequenced store release, store release intervals, automatic/computer aided release or direct/manual release by the pilot.

g. Necessary signals to provide for the option of automatic secondary methods for bomb rack unlock or store release should primary unlock or release modes fail.

h. Controls to provide jettison of all stores simultaneously or in an orderly sequence and in a safed mode, unless other exclusive policies or procedures prohibit.

i. Controls to provide select jettison of any single store in a safed mode unless other exclusive policies or procedures prohibit.

j. A visual presentation, following any type of release, automatically reflecting the quantity, type, physical location and status of all remaining stores, including indications of any store which failed to separate properly.

k. Controls to rapidly safe and deselect stores, and, if circumstances warrant, the immediate selection and arming (see 6.4.3) of alternative stores to counter a change of threat or target.

l. Continuous monitoring of the complete SMS for failures via built-in-test (BIT) (see 6.4.7) circuitry and provide the pilot with a display of equipment operational/fail status. The BIT should have the capability of identifying failures and isolating the failures to the weapon replaceable assembly, including, where feasible, the bomb racks.

3.18 Control panels. Provisions shall be made for the concurrent installation of control panels for all weapon systems for which the aircraft has capability. Incorporation of control panels into a single universal panel is acceptable.

3.18.1 Control panel requirements. The control panel shall meet the requirements of MIL-E-5400 (electronic equipment), MIL-STD-810 (environmental), MIL-C-6781 (aircraft equipment), MIL-C-81774 (control panel), MIL-STD-454 (electronic equipment), MIL-STD-461 (EMC), MIL-STD-781 (reliability), and MIL-STD-1472 (human engineering). These specifications and standards shall be tailored to meet the aircraft mission requirements described in the applicable aircraft detail specification.

3.18.2 Location of control panels. Control panels shall be installed at locations which will enable convenient and safe operation of the store release and bomb bay door controls by designated crew members in their normal operating positions. The location of the panels relative to the respective crew members shall be in accordance with table I.

TABLE I. Location of control panels relative to crew members.

Crew members required on the aircraft	Control systems required to be available to crew	
	Store release control systems	Bomb bay door control systems
Pilot only	Primary and secondary	Primary and secondary
Pilot	Primary and secondary	Primary and secondary
and		
Co-Pilot	Secondary	Secondary
Pilot	Primary and secondary	Primary and secondary
and		
Co-Pilot	Secondary	Secondary
and		
Bombardier	Primary	Primary
Pilot	Primary and secondary	Primary and secondary
and		
Bombardier/ Navigator	Primary and secondary	Primary and secondary

3.18.3 Illumination of controls. Control panels, switches, and controls shall be illuminated. Indicator lights specified for the installation shall have provisions for dimming from bright daylight visibility to complete blackout. For all internal store installations, the following indicators shall be provided to indicate the status of store stations and bomb bay doors.

3.18.3.1 Store station status indicator lights. A green indicator for each store station shall be installed in the release control panel (see 3.17.1) and shall indicate the location of each store loaded in the aircraft according to station location.

3.18.3.2 Store "Ready for Release" indicator light. An amber indicator shall be installed in the release control panel and shall indicate the stores ready for release, upon actuation of the primary or secondary release (see 6.4.18 and 6.4.25) control. The indicator shall turn off upon release of the store.

3.18.3.3 Bomb bay door status indicator lights. One red indicator for each bomb bay shall be provided for indicating the position of the bomb bay doors. The indicator shall be installed in or adjacent to the bomb bay door control handle. The condition of the bomb bay control circuit shall be indicated by the position of the control handle. The following markings shall be placed adjacent to the bomb bay door control handle:

BOMB BAY DOORS
CLOSED

OPEN

The indicator shall be off (unlighted) when both doors are in the fully closed condition and the bomb bay door handle is in the "CLOSED" position. The indicator shall turn on (lighted) automatically when the bomb bay door control handle is thrown to the "OPEN" position and shall remain on until both doors have reached the fully open position (see 3.9.3.1.1). When the doors have reached the fully open position, the indicator shall turn off automatically and remain off until the bomb bay door control handle is thrown to the "CLOSED" position, at which time the indicator shall turn on automatically and shall remain on until the doors have returned to the fully closed position. The indicator shall operate in conjunction with both the primary and secondary bomb bay door control system. If duplicate bomb bay door controls are installed for both the pilot and bombardier, both controls shall be equipped to operate as required above. If duplicate controls are not installed for the pilot and bombardier, a repeater indicator and red indicator shall be installed at the station (either pilot's or bombardier's) which does not have the controls. The repeater indicator shall show the position of the primary bomb bay door control handle. The red indicator shall duplicate the condition (on or off) of the primary bomb bay (see 3.20.1) door status indicator.

3.18.4 Torpedo, mine, pilotless aircraft and special weapons controls. Installation and operation of special controls, such as starting lanyards, firing lanyards, and umbilical (see 6.4.28) cables, for releasing or launching of torpedoes, mines, pilotless aircraft, and other special weapons as specified in the aircraft detail specification, shall be provided for in the store installation. Provisions shall be included in the installation for retracting to stowed position or jettisoning of the lanyard or cables after release of the store,

3.19 Bomb rack locks. Each weapon station bomb rack shall be provided with a locking mechanism which shall:

a. Be capable of being individually locked and unlocked during flight.

b. Mechanically prevent activation of the release mechanism of the bomb rack.

c. Interrupt electrical power to the bomb rack release unit.

d. Provide remote indication of the position of the bomb rack lock.

e. Not provide a mechanical or electrical release signal to the bomb rack release mechanism upon actuation of the "unlock" position.

f. Provide an emergency over-ride feature which, in the event of failure of the rack lock drive mechanism or electrical circuit thereto, permits, upon its actuation, the removal of the mechanical restraint and the re-establishment of the electrical circuit to the bomb rack release mechanism. The action of removing the mechanical restraint and re-establishment of the electrical circuit to the bomb rack release mechanism shall not cause operation of the bomb rack mechanism on the bomb rack itself.

3.20 Bomb bay door controls. Two separate bomb bay door control systems shall be installed to control the operation of the bomb bay doors. Other operation of the bomb bay doors by the secondary system shall be independent of any previous setting, operation, or failure of the primary control system. The two control systems shall derive the energy required for operation from two independent sources; i.e., electrical-mechanical and hydraulic-electrical. The same type of energy may be used for both primary and secondary systems, if two completely independent sources are used.

3.20.1 Primary bomb bay controls. The primary bomb bay controls shall be operable for controlling the bomb bay mechanism during normal, planned operation and release of the store load. The controls shall be operable from control panels in accordance with 3.20. During sequential release of stores, the controls shall be capable of positively preventing the bomb bay door mechanism from reverting to the carrying position until after the last of the selected stores has been dropped.

3.20.2 Secondary bomb bay controls. The secondary bomb bay door controls shall be operable for emergency control of the bomb bay doors. These controls shall be identified by readily apparent permanent labels as "Emergency Bomb Bay Door Controls". Failure of the primary operating system shall not interfere with the operation of the secondary control system. Provision shall be made to release or jettison the stores should the mechanism for the operation of the bomb bay jam in a partially open or closed position. The secondary control system shall provide for emergency return of the operating mechanism to the carrying or stowed position. Provisions shall be made for manual jettison of the entire bomb bay mechanism with stores attached should the operating mechanism jam in such a position as to prevent successful jettison of the stores alone or the execution of a safe landing with stores attached. Provisions to prevent accidental jettison shall be provided.

3.20.3 Mechanical bomb bays. The primary and secondary controls for mechanical bomb bays shall be the same as specified for bomb bay doors.

3.20.4 Safety interlocks. A safety interlock system shall be provided to prevent accidental release of stores with the bomb bay closed or in the stowed position.

3.20.5 Bomb bay door safety interlock for loading operation. A safety interlock shall be provided for use of ground operating personnel to permit positive locking of doors in the desired position, while operating in or around the bomb bay.

3.21 Electrical devices and wiring. The installation of electrical equipment and wiring shall be in accordance with MIL-E-7080 and MIL-W-5088. All electrical switches, connections, plugs, receptacles, terminals, and wiring necessary for the proper functioning of the control systems shall be installed where required (see 3.2 and 3.3). Techniques used for system installation shall be designed to minimize the electromagnetic interference induced into the system by direct radio frequency radiation. Installation methods should include, but not be limited to, fiber optics, MIL-C-85485 filter line wire, MIL-C-38999 and MIL-C-29600 connectors, cable shielding, back shells, and MIL-STD-1760 Aircraft/Store Electrical Interconnection System. Where applicable, the shielding effectiveness of umbilical harnesses shall be verified in accordance with MIL-STD-1377.

3.21.1 Separation of store release circuits from power carrying leads. Store release control circuits and rocket firing circuits shall not lead through connectors or receptacles common to each other. If common terminal strips are used, store release leads and rocket firing leads shall be separated from each other and from other adjacent circuits by not less than one vacant terminal spacing. Electrical release systems for aircraft stores shall be wired so that the release wiring is physically and electrically isolated from all other power-carrying leads to preclude inadvertent release of stores or firing of rockets by induced currents or short circuits.

3.21.1.1. Separation of aircraft monitor and controls (AMAC) circuitry from other aircraft circuitry. AMAC circuitry wiring should not lead through connectors or receptacles common with any other aircraft circuits/wires. If a common connector or receptacle is necessary, the contacts carrying AMAC signals shall be separated from the remaining contacts and isolated by a physical barrier within the connector or receptacle. When common terminal strips are used, AMAC wires shall be separated from each other and from other adjacent circuits by not less than one vacant terminal spacing. AMAC control unit(s) shall be physically separated from all other control units and the AMAC system circuitry/wiring shall be physically and electrically isolated from all other aircraft circuits/wires to preclude inadvertent operation or electrical intra-action between the AMAC units, circuitry/wiring and any other aircraft unit, circuits/wires.

3.21.2 De-energizing of release circuits. Electrical release circuitry, except emergency jettison circuitry, shall be de-energized automatically when the aircraft is in the landing configuration. Emergency jettison circuitry shall be de-energized automatically when aircraft weight is on the landing gear; for aircraft equipped with bomb bays, all electrical release circuitry shall be de-energized when bomb bay doors are closed.

3.21.3 Availability of electrical power for nuclear stores. Electrical power shall be available to control and monitor all nuclear stores whenever aircraft has electrical power.

3.21.4 Removal of all electrical power from nuclear stores/aircraft interface. A positive means shall be provided during flight, to remove all electrical power from nuclear stores through the aircraft interface in

addition to power removal by means of the normal AMAC control switch.

3.22 Electro-explosive devices (EEDs). All circuits containing EEDs shall be designed and installed in strict accordance with the practices prescribed in NAVSEA OD 30393. Techniques used for system installation shall ensure that the specified safety margins designed to prevent inadvertent operation of EEDs shall be tested in accordance with MIL-STD-1385.

3.23 Aerodynamic aircraft store/missile compatibility. In all cases where stores or guided missiles are specified, or under consideration, the wind tunnel tests required shall include the following (see 6.3):

a. Variation of drag coefficient (C_D), lift coefficient (C_L), pitching moment coefficient (C_m), and slope of pitching moment coefficient curve ($dC_m/d\alpha$) versus Mach number (M) and angle of attack of the aircraft (α) without the store loads and with pylons installed unless pylons are not used or are dropped with the stores.

b. Tests of the parameters in (a) above of proposed configurations with external stores or guided missiles. Emphasis should be placed on investigation in regions where unusual or critical conditions are found to exist.

c. Tests of the parameters in (a) above of proposed configurations of semi-submerged stores or guided missile installations with doors or other ejection apertures open and closed.

d. Tests of the parameters in (a) above of proposed configurations of internal stores or guided missile installations with doors and other store ejection apertures open. Emphasis shall be placed on investigation in regions where unusual or critical conditions are found to exist.

e. Investigate the launch and jettison characteristics unless it can be shown on the basis of previous experience or similar configurations that these conditions are not critical.

f. Measure the pressure distribution over critical regions.

3.24 Adapters. Store installations shall carry all stores specified for the aircraft with the minimum use of adapters to convert from one type of store to another. The installation of adapters shall not affect or limit aircraft performance.

3.25 Provisions for environmental conditions. Provisions shall be included in both external and internal installations to ensure satisfactory operation of all equipment within the temperature range from -54°C (-65°F) to 93.3°C (200°F) and the humidity ranges encountered within this temperature range, unless otherwise required for specific applications. All store installations shall prevent deterioration and malfunction of equipments when subjected to the dynamic and climatic environments of MIL-T-7743 or the applicable aircraft detail specification.

3.26 Safety. Suspension and release equipment shall provide for protection against inadvertent release of droppable stores as a result of mechanical failure(s) (due to structural and personnel handling) or inadvertent electrical signals which would normally activate the release systems.

3.26.1 Ground safety devices. Suspension and release equipment shall be equipped with a positive safety device (mechanical or electrical) to preclude the release (or ejection) of a droppable store, when the aircraft is not airborne. Such safety devices shall be disengaged either prior to takeoff or during flight.

3.26.2 Erroneous switch selection and single component failure. The control of store stations shall be such that no single operating error on the part of any crew member shall result in the inadvertent arming and release of a store. No single component failure in the arming or release control system shall result in the inadvertent arming or release of a store.

3.26.3 Use of suspension and release equipment components common to both conventional and special stores. Common components may be used in the release control system of both conventional and special stores provided that, in the operation of controls to accomplish release of conventional store, no single inadvertent control operation or no single component failure shall result in the release of a special store.

3.26.4 Safety margins. Safety margins to protect against inadvertent operation of electro-explosive devices (EEDs) by electromagnetic interference are specified in MIL-STD-1385. Store selector switches for stations configured to carry, arm, and release nuclear weapons shall be capable of being locked and sealed to preclude erroneous selection.

3.26.5 AMAC selector switches. The aircraft monitor and control (AMAC) panel arming mode selector switch(es) shall be capable of being locked and sealed in the OFF position.

3.26.6 Rotary switches. The knobs of rotary switches used in the selection, arming, and release circuits of nuclear weapons, shall be D-slotted knobs with locking screws such that the knob can be positioned and locked in one and only one position on the shaft. D-slotted knobs shall be in accordance with MIL-K-3926.

3.26.7 Release system control. On weapons stations which are designated for nuclear weapons carriage and release, release consent relays shall be installed in the electrical circuit which carries the firing signals to the release cartridges in the store pylon. The release consent relay shall normally be open circuit and shall interrupt the firing signal to the release cartridge(s) until the pilot/operator closes the relay via a release consent switch in the cockpit. A separate release consent switch shall be provided for each station designated for nuclear weapons and shall be hardwired to the relay. The release consent switch(es) shall be capable of being locked and sealed to preclude erroneous selection.

3.26.8 Jettison switches. Nuclear station jettison switches shall be placed and guarded in respect to other normally used switches to prevent inadvertent or accidental actuation.

3.26.9 Pylon access doors. Pylon (see 6.4.19) access doors shall permit opening, closing, and viewing of the bomb rack lock locking mechanism without removal of the aircraft fairing.

3.26.10 Jettison control. When an aircraft nuclear weapon system includes manual jettison provision, two separate control sections shall be required for operation.

3.26.11 Bomb rack controls for multi-seat aircraft. The controls for the operation of the bomb rack locks shall be accessible to and operated by someone other than the person having access to and control over the selection and operation of the bomb racks themselves. One switch, with guard and provisions for safety wire sealing, shall be available to the same person having access and control of the individual bomb rack lock switches for simultaneous operation of the emergency override feature.

3.27 Electromagnetic environmental effects (E^3). The armament release system shall not malfunction or exhibit degraded performance when exposed to the electromagnetic energy encountered in the aircraft system's operational environment. The armament release system, as a subsystem, shall meet the susceptibility and emission requirements of MIL-STD-461, including the radiated susceptibility RS03 electric field requirements of 200 volts per meter (V/m) from 14 kilohertz (kHz) to 10 gigahertz (GHz).

3.27.1 Hazards of electromagnetic radiation to ordnance (HERO). The overall ordnance system shall be designed to prevent inadvertent store release, including premature firing of EEDs by any form of electromagnetic or electrostatic energy. All modes of system operation during the mission, including loading, unloading, checkout, and prelaunch shall be considered. The HERO test levels shall be those specified in MIL-STD-1385 (see 4.3.5.1c). NAVSEA OD 30393 shall be used as a design guide in implementing MIL-STD-1385.

3.27.2 Lightning protection. The ordnance system shall be designed to provide lightning protection in accordance with MIL-B-5087 and MIL-E-6051. The electromagnetic interference control plan (EMICP) shall include how all elements of the ordnance system shall be adequately protected against the lightning hazard (see 4.3.5.1a).

3.27.3 Electromagnetic pulses (EMP). All aircraft droppable stores and associated release systems shall be tested to determine vulnerability to EMP (see 4.3.5.2 and 6.3).

3.27.4 TEMPEST. All droppable store systems, handling secure communications, shall comply with the compromising emanation requirements of NACSIM 5100 (see 4.3.5.3 and 6.3).

3.27.5 Equipment, system, and subsystem design. The equipment, system or subsystem design shall meet the applicable requirements of MIL-B-5087, MIL-E-6051, MIL-STD-461, MIL-STD-1377, MIL-STD-1385, MIL-HDBK-235-1, and MIL-HDBK-237.

3.28 Safety precautions. The aircraft monitor and control (AMAC) system and the release system for nuclear weapons shall be coordinated closely with the acquiring activity to ensure the application of the latest concepts for nuclear safety. The safety precautions applied shall not degrade operational capability or reliability of the weapon system to function properly when required (see MIL-STD-882 and MIL-HDBK-255).

3.28.1 Safety standards. The Department of Defense has established four nuclear weapon system safety standards required for nuclear safety design of an aircraft/nuclear weapon system. These standards require that there shall be positive measures to:

a. Prevent nuclear weapons involved in accidents, incidents, or jettisoned weapons from producing a nuclear yield.

b. Prevent deliberate prearming, arming, launching, firing, or releasing of nuclear weapons except upon execution of emergency war orders or when directed by competent authority.

c. Prevent inadvertent prearming, arming, launching, firing, or releasing of nuclear weapons in all normal and credible abnormal environments.

d. Ensure adequate security of nuclear weapons.

The term "positive measures to prevent" can be accomplished by physical, electrical, or mechanical restraints and administrative controls, such as nuclear weapon system safety rules and directives issued by competent authority. The phrase "positive measures to prevent" does not mean "absolute assurance against"; however, maximum safety consistent with operational requirements must be provided.

3.29 Foreign object damage (FOD). All system installations during suspension, release, or jettison modes shall not allow engine ingestion, interference of aircraft controls or damage to the aircraft as a result of system or system component operations.

3.30 Drawings. Drawings pertinent to droppable store installations shall be in accordance with the requirements of MIL-D-18300 and MIL-STD-100 (see 6.3).

3.31 Weight. The total weight of the store installation shall be such that it shall minimize the effect on aircraft performance.

3.32 Workmanship. The workmanship of the components of the store installation equipment; i.e., suspension and release equipment and adapters, shall be such as to ensure the ability of the equipment to meet performance requirements under all applicable environmental conditions specified herein.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance

of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 3. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspection tests. The inspection tests specified herein are classified as:

a. Engineering approval tests (see 4.3 and 6.4.10).

b. Bench tests (see 4.4 and 6.4.4).

c. Preflight tests (see 4.5 and 6.4.17).

d. Flight tests (see 4.6 and 6.4.11).

4.3 Engineering approval tests. Engineering analysis, laboratory, and flight tests shall be performed to demonstrate that the design of the installation assembly shall meet requirements (see section 3) in regard to functional, electrical, and structural parameters. Additionally, tests shall determine physical interference, system stability, structural compatibility, and electrical systems compatibility. All of these parameters are applicable to specific aircraft. When acceptable limits have not been established by the acquiring activity, limits shall be proposed. Normally, engineering approval tests shall be conducted on the full scale development unless otherwise stipulated by the acquiring activity.

4.3.1 Analysis/test program. All aircraft droppable store interface systems; i.e., suspension and release equipment and adapters, shall undergo an analysis program including structural analysis, fault free analysis, and sneak circuit analysis to ensure that the proposed installation systems are compatible with design requirements. The acquiring activity shall determine specific analytical methodologies or, in the absence of such requirements, the contractor shall propose methodologies. Laboratory structural tests shall consist of static loading system tests to verify analytical results, repeat load tests (repeat applications of nominal loads for equivalent lifetime of equipment), vibration tests, shock tests, including catapult and arrested

landing environment and operational tests which may be adversely affected under various climatic environments. All test equipment shall be calibrated in accordance with the requirements of MIL-STD-45662.

4.3.1.1 Test procedures. Test procedures shall detail test specifications, test equipment (with associated tolerances/accuracies) and test methodologies (see 6.3).

4.3.2 Wind tunnel tests. Where applicable, wind tunnel tests required shall include aerodynamic aircraft store/missle compatibility (see 3.23) and the following (see 6.3):

a. Incidence of bomb bay buffeting and reversal of loads.

b. Store oscillations which may be caused by bomb bay buffeting upon release of stores.

4.3.3 Rearming procedure test. A time and motion study of the complete rearming procedure of the aircraft shall be performed indicating the most efficient rearming procedure (see 3.8.2 and 6.3). The study shall begin with required store(s) on ground handling equipment outside the circular area which encompasses the extremities of the aircraft. The store(s) shall be moved into position, hoisted, and loaded properly on the appropriate release equipment. The study shall end when the full required store load (see 3.4) is ready to be airborne and released from the aircraft.

4.3.4 Check-out. Operation checks on the droppable store system to ensure satisfactory operation shall be performed. As a minimum, the following shall be determined:

a. Adequacy of mechanical fastening and all hydraulic, pneumatic, and electrical connections in the store release control system.

b. Adjustment of all release control system cables.

c. Functioning of all safety devices.

d. Functioning of hoisting equipment and loading facilities.

e. Functioning of all switches and guards.

f. Functioning and adjustment of individual store release controls and indicating lights.

g. Access for adjustment of special required stores (see 3.10.2).

h. Functioning of release equipment.

i. Functioning of the primary and secondary bomb bay door control system.

j. Functioning of the primary and secondary release and control system.

k. Adequacy of clearance and accessibility (see 3.9 and 3.10).

l. Separation of store release system electrical circuits from rocket circuits.

4.3.5 Electromagnetic compatibility (EMC). These tests shall be performed on each system and subsystem to ensure that the droppable store shall not malfunction or be a source of interference signals causing the degradation of performance of other aircraft or ground support equipment (see 6.3).

4.3.5.1 Aircraft E^3 systems tests. The droppable store system shall not be a cause of malfunction or degradation of the aircraft system when subjected to the system operational environment specified in MIL-HDBK-235-1. This shall be verified during aircraft system tests as follows:

a. Conduct intrasystem EMC tests in accordance with MIL-E-6051 and direct current (dc) bonding resistance measurement tests per MIL-B-5087. Test methods used to demonstrate protection against lightning hazard shall be in compliance with MIL-STD-1757.

b. Conduct intersystem electromagnetic vulnerability (EMV) tests in accordance with the requirements of MIL-HDBK-235-1.

c. Conduct Hazards of Electromagnetic Radiation to Ordnance (HERO) tests in accordance with MIL-STD-1385.

4.3.5.2 Electromagnetic pulses (EMP). EMP analysis and tests shall be performed on all aircraft droppable stores and associated release systems to determine vulnerability to EMP (see 6.3).

4.3.5.3 TEMPEST. For systems required to comply with NACSIM 5100 (see 3.27.4), TEMPEST analysis and tests shall be performed to the extent specified in the aircraft detail specification (see 6.3).

4.4 Bench tests. Prior to installation in aircraft, each and every piece of equipment shall be bench tested at the installation point to determine that the equipment has neither been damaged nor the performance and operation affected in shipping and handling or during the interchange of components, and to establish that their controls function properly within prescribed limits (see 6.3).

4.5 Preflight tests. Complete provisions for the droppable store load shall be tested and adjusted as required to establish that the equipment has been installed properly and that basic performance requirements of the equipment are met. Preflight tests shall consist of such tests and adjustments, in accordance with approved procedure, necessary to ensure that all cabling is satisfactory, primary power is adequate, and equipment operation is above the minimum standard for acceptance (see 6.3).

4.5.1 Weapon system check. A preflight electrical test of the aircraft/AMAC system shall be performed at the nuclear weapon aircraft-to-store interface connector. The preflight test shall incorporate provisions to determine the conformance of the aircraft/AMAC system to the

electrical isolation requirements and power supply characteristics specified in the Basic Interface Requirement document that applies to the weapon system under test. The Basic Interface Requirement document is written by the Aircraft Monitor and Control (AMAC) Project Officers Group (POG) and promulgated by Sandia National Laboratories, Albuquerque (SNLA), New Mexico. In addition to the electrical isolation and power supply characteristic tests, the preflight test shall also include all other operational testing that pertains to the system under test as tested by standard Organizational Level test equipment available.

4.6 Flight tests. These tests shall be conducted on each aircraft to establish that the entire droppable store system is functioning properly. Production flight tests shall check all individual equipment and systems using a greatly abbreviated version of the engineering approval flight tests. Such tests shall include at least those items which were shown, during the engineering approval flight tests, to be marginal or difficult to control in the production aircraft (see 6.3).

4.7 Testing of provisions for service-installed equipment. Where contractors are authorized or required to make provisions for service-installed equipment, the contractor shall make temporary installations of the equipment in each aircraft. Any changes in the method of installations prior to the specific aircraft installation shall be reviewed by the acquiring activity to determine a viable engineering approval analysis/test program (see 4.3.1). Preflight and flight tests shall be conducted after installation approvals are provided by the acquiring activity. If applicable, the contractor shall request the acquiring activity to provide the necessary equipment required for the temporary installation.

4.8 Equipment failure. All equipment shall arrive in fully operable condition, or operable with adjustments, as necessary, in accordance with approved adjustment procedures for the equipment. Equipment requiring more than adjustment shall be unsatisfactory (see 6.3).

4.9 Equipment repair. Equipment shall be made operable by making minor repairs, as necessary, such as replacement of easily replaceable subassemblies. When specified by the acquiring activity, repairs and adjustments of a major nature shall be required for correction of defective equipment.

4.10 Check-off list. Results of tests conducted on each equipment shall be recorded on a check-off list. These shall be retained by the contractor for review by representatives of the acquiring activity in studies leading to proposals for simplifying or otherwise improving the test requirements involved (see 6.3).

4.11 Preparation for delivery. The droppable store installations in the aircraft shall be properly adjusted and serviced prior to delivery of the aircraft.

5. PACKAGING

This section is not applicable to this specification.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The requirements in this specification are pertinent to the installation of droppable store systems and equipment(s) in all types of naval aircraft and shall be applicable to any particular model aircraft if conformance to this specification is required by the applicable aircraft detail specification.

6.1.1 Modification. Modification or amplification of the requirements of this specification, as applicable to a particular model aircraft, will be incorporated in the aircraft detail specification at the time of its preparation. Modification or amplification of these requirements, subsequent to the effective date of the applicable aircraft contract, shall be accomplished in accordance with established change procedures. Requests for modification shall be submitted in writing and shall include complete description, supporting data, and reason for modification.

6.1.2 Waivers. Requirements of this specification may be waived for specific applications upon presentation of substantiating data to and approval from the acquiring activity.

6.1.3 Furnished data. Specifications, drawings, and other data required for the installation of Government-furnished equipment will be supplied to the contractor by the acquiring activity upon request.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractural application of the data requirements, a Contract Data Requirements List (DD FORM 1423) must be prepared to obtain the data, except where DOD FAR Supplement 227.405-70 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.3.5	DI-R-7096	Electromagnetic compatibility program plan	--------
4.3.5	DI-EMCS-80199	Electromagnetic interference control plan	--------

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
4.3.5	DI-EMCS-80201	Electromagnetic interference test plan	--------
3.30	DI-DRPR-81000	Product drawings and associated lists	--------
3.30	DI-DRPR-81001	Conceptual design drawings and associated lists	--------
3.30	DI-DRPR-81002	Developmental design drawings and associated lists	--------
3.8.1, 3.27.3 3.27.4 4.3.1.1 4.3.3, 4.4 4.5, 4.6	DI-NDTI-80808	Test plans/ procedures	--------
4.3.5	DI-EMCS-80200	Electromagnetic interference test report	--------
4.8	DI-R-21598	Report, failure	--------
3.23 4.3.5.2 4.3.5.3 4.4, 4.5,4.6	DI-NDTI-80809A	Test/inspection report	--------
4.1.1	DI-NDTI-80809A	Test/inspection report	10.2.7, only
4.10	DI-MISC-80523	Operations checklists	--------

The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 Definitions. Terms, as used herein, are defined as follows:

6.4.1 Aircraft store. Any device intended for internal or external carriage and mounted on aircraft suspension and release equipment, whether or not the item is intended to be separated in flight from the aircraft. Aircraft stores are classified in two categories as follows:

a. Expendable store. An aircraft store normally separated from the aircraft in flight such as a missile, rocket, bomb, nuclear weapon, mine, torpedo, pyrotechnic device, and other similar items.

b. Non-expendable store. An aircraft store which is not normally separated from the aircraft in flight such as a tank (fuel and spray), line-source disseminator, pod (refueling, thrust augmentation, gun, electronic-countermeasure, and data link), multiple rack, target, cargo drop container, drone and other similar items.

6.4.2 Armament datum line. The armament datum line is a reference line used for establishing the alignment of all weapons and armament control equipment installed in the aircraft. The armament datum line for each model aircraft is based on the flight and armament characteristics of the aircraft.

6.4.3 Arming. The process of removing the safety devices and using signal paths necessary to allow operation, firing, or detonation of expendable stores.

6.4.4 Bench tests. Bench tests are those tests and adjustments required to be accomplished on equipment prior to installation in aircraft.

6.4.5 Bomb bay door control system. The bomb bay door control system is all the mechanism necessary to operate the bomb bay doors.

6.4.6 Bomb rack. A device for suspending and releasing stores from aircraft. The designs of bomb racks vary but usually fall within one of two general categories: single suspension (store suspended by single lug) or double suspension (store suspended by two lugs). Bomb racks contain an integral release mechanism and are rigidly attached to the aircraft structure and are not readily removable.

6.4.7 Built-in-test (BIT). A test approach using built-in-test equipment (BITE) or self test hardware or software to test all or part of the unit under test.

6.4.8 Droppable stores. Items such as bombs, missiles, aircraft mines, torpedoes, auxiliary fuel tanks, dispersal units, gun containers, sonobuoys, and other items which may be suspended and released from the carrying aircraft.

6.4.9 Ejection. Separation of a store with the the assistance of a force imparted from a device, either external or internal to the store.

6.4.10 Engineering approval tests. These tests shall consist of engineering analysis, laboratory, and flight tests on applicable aircraft to ensure design performance during the maintenance, loading, suspension, and release of droppable store installations. All analysis and laboratory tests shall be conducted prior to flight tests to ensure the safety of the aircraft.

6.4.11 Flight tests. These tests shall be conducted on every aircraft submitted to the acquiring activity for acceptance to determine that the installation provisions for droppable stores are operating satisfactorily.

6.4.12 Handling equipment. The equipment used to handle stores in general. This equipment includes manually or power operated bomb hoists, bomb skids, trucks, trailers and trailer adapters, bomb hoisting slings, bomb handling rails, and weapons loader.

6.4.13 Hoist. A manually or power operated equipment, providing mechanical advantage to facilitate the handling of heavy stores during their transfer from deck or ground positions into engagement with the release equipment on the aircraft.

6.4.14 Jettison. An emergency provision for the intentional separation of the store from the aircraft in a safed/unarmed condition.

6.4.15 Launching. The operation of intentionally separating missiles or rockets from the aircraft for normal employment.

6.4.16 Loading. The operation of installing stores on the aircraft suspension and release equipment.

6.4.17 Preflight tests. Preflight tests are those tests required to be accomplished on every completed aircraft droppable store installation provision to determine that the equipments have been installed properly.

6.4.18 Primary release. The principal provisions for safe separation of stores or suspension items (or both) from the aircraft.

6.4.19 Pylon. A pylon is a structural assembly externally attachable on the wing or fuselage of an aircraft, with provisions for attaching bomb racks, missile launchers, and associated umbilical cables.

6.4.20 Rearming. The procedure for readying stores and munitions for a specific military mission and placing those stores and munitions in or on the release equipment in the aircraft so that they may be released, fired, or launched in the required manner.

6.4.21 Release. The mechanical, electrical, pneumatic, hydraulic, or explosive actions (or any combination thereof) leading up to and resulting in the separation of the store from the carrying aircraft.

6.4.22 Release controls. A group of devices, such as switches, levers, valves, intervalometers, station selectors, and station distributors, which is associated with release equipment to ensure its operation at the proper time and in required sequence.

6.4.23 Release equipment. The mechanical, electrical, pneumatic, electronic, hydraulic or explosive devices, mechanisms, and equipment used to suspend and release droppable stores from the carrying aircraft. This equipment includes bomb racks, bomb shackles, bomb ejectors, shackle release mechanisms, sway braces, fairings, arming mechanisms, and launchers.

6.4.24 Safe separation. The parting of a store from an aircraft without damage to, contact with, or adverse effects on the aircraft, its suspension and release equipment, or other weapons.

6.4.25 Secondary release. An alternate provision for safe separation of stores or suspension items (or both) from the aircraft in the event of primary release failure.

6.4.26 Store carrier. A structure on which one or more stores may be rearmed remotely from the aircraft and hoisted as a unit into position in the aircraft.

6.4.27 Sway bracing. That mechanism within the physical triaxial restraint system which partially or totally reacts to store yaw and pitching moment in addition to lateral store loads.

6.4.28 Umbilical. Normally a coolant line or electrical harness which attaches to the store with a quick disconnect fitting or plug.

6.4.29 Weapons loader. A manually or power operated vehicle equipped to transport heavy stores and raise them into engagement with the release equipment on the aircraft.

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6.5 Subject term (key word) listing.

Aerodynamic aircraft store/missile compatibility
Bomb bay door controls
Bomb rack locks
Clearance
Control panels
Safety precautions
Stores management system (SMS)

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - AS

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INDEX

INDEX

INDEX

INDEX

INDEX

INDEX

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-I-86710(AS)	94/01/28

3. DOCUMENT TITLE

INSTALLATION OF DROPPABLE STORES AND ASSOCIATED RELEASE SYSTEMS

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

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c. ADDRESS (Include Zip Code) CODE SR3 LAKEHURST, NJ 08733-5100	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340