

MIL-R-18370A(WP)

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SUPERSEDING

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30 December 1954

MILITARY SPECIFICATION

RELEASE SYSTEMS FOR THE EJECTION OF LIFE RAFTS FROM NAVAL PATROL AND TRANSPORT SERIES AIRCRAFT, DESIGN REQUIREMENTS FOR

This specification has been approved by the Bureau
of Naval Weapons, Department of the Navy.

1. SCOPE

1.1 This specification covers the design parameters and criteria for the installation of manually and automatically operated release systems for the ejection of life rafts from Naval patrol and transport series aircraft.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, and publications form a part of this specification. Unless otherwise specified, the issue in effect on date of invitation for bids shall apply:

SPECIFICATIONS

Federal

CCC-T-191 Textile Test Methods

Military

MIL-C-5015 Connectors, Electric, "AN" Type

MIL-C-5040 Cord, Nylon

MIL-E-7080 Electric Equipment, Aircraft, Selection
and Installation of

MIL-STD-1316

MIL-STD-1316

MIL-STD-8636 Details for Use on Interior Surfaces

MIL-M-18012 Markings for Aircrew Station Displays
Design and Configuration of

Bureau of Naval Weapons

SD-24 General Specification for Design and
Construction of Aircraft Weapon Systems

STANDARDS

Military

MIL-STD-105 Sampling Procedures and Tables for
Inspection by Attributes

MIL-STD-203 Cockpit Controls, Location and Actuation
of, for Fixed Wing Aircraft

(When requesting any of the applicable documents, refer to both title and number. All requests should be made via the cognizant Government quality control representative. Copies of this specification and other unclassified specifications and drawings required by contractors in connection with specific procurement functions should be obtained upon application to the Commanding Officer, Naval Supply Depot (Code 1051), 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. All other documents should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Materials and components - Materials and components shall conform to applicable specifications as listed or required herein. Materials, components, standard parts, processes, corrosion protection, and design features significant for adequate corrosion behavior which are not covered by applicable specifications or are not specifically described herein shall be selected in accordance with SD-24. Unless otherwise specified, the materials and components (except for the metallic parts) used in the construction of the release systems for the ejection of life rafts from Naval patrol and transport series aircraft shall have been manufactured not more than 12 months prior to the date of delivery of the aircraft.

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3.2 Design and construction -

3.2.1 Location - The location of all the life raft compartments in all the Naval aircraft shall be approved by the Bureau of Naval Weapons. The location of the life raft compartments shall be determined by the following requirements:

- (a) The life raft shall be readily accessible to the escaping crew members.
- (b) The structural strength of the area shall be capable of withstanding an emergency ditching without collapsing or damaging of the compartment.
- (c) The life raft shall be capable of being inflated and ejected without any restriction.
- (d) The location of the compartment in relation to the slip stream of the aircraft and the location of the antenna and stabilizer so that no part of the aircraft shall be damaged or fouled, by the compartment cover, life raft, or by any component of the life raft, in the event of inadvertent operation of the release system during flight.

The preferred location is in the upper part of the fuselage, adjacent to the wing, or in the wing with the compartment opening through the upper surface of the wing. Under no circumstances shall the compartment opening be below the estimated water line of the ditched aircraft.

3.2.2 Compartment - The compartment shall be of sufficient size to assure satisfactory stowage of the specified raft, complete with the carbon dioxide filled cylinder and emergency (survival) equipment, and the emergency radio as specified by the Bureau of Naval Weapons. The size of the compartment opening shall be greater than the dimensions of the stowed raft and all the equipment to assure unrestricted removal or ejection of all the stowed items. The compartment shall not contain any obstructions, sharp edges, or configurations which could tear, choke or damage the raft, or retard the inflation and ejection of the life raft. When practicable, at least one compartment in the patrol and transport series aircraft shall be so constructed that, when in flight, the crew members shall be able to disconnect the life raft from the release systems and shall be able to remove the life raft, emergency gear, and radio from the compartment to the inside of the aircraft for dropping to effect rescue. The type of raft, emergency (survival) equipment, and emergency radio to be stowed in each compartment of the aircraft will be furnished to the aircraft manufacturer by the Bureau of Naval Weapons.

3.2.3 Cover - The compartment shall have a rigid cover designed to withstand 2.0 pounds per square inch interior or exterior loading. The cover shall not buckle under normal use and shall fit in a manner that shall prevent the entrance of water, dirt, or sand. A positive latching device shall be provided which

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when released, shall free the cover completely from the aircraft. The compartment cover shall not be hinged to the aircraft except, when it is considered necessary, due to the design of the aircraft, since the cover will act as a missile and damage the aircraft in the event of inadvertent operation of the release system during flight. Approval from the Bureau of Naval Weapons shall be obtained before any compartment cover is hinged to the aircraft. Provision shall be made to permit the removal of the compartment cover for the inspection of the stowed life raft and the equipment without operating the aircraft release systems and the carbon dioxide filled cylinder on the stowed life raft.

3.2.4 Cover locking device - The locking mechanism shall hold the cover securely in position until the operation of the release. The cover and lock shall be so designed that take-off, catapulting, landing, arresting, flight loads, and flight and gunfire vibration shall not cause failure of the lock in flight. The latch mechanism shall be such that applied loads of 2.6 pounds per square inch on the cover shall not appreciably increase the force required, at the release points, to put the system in operation.

3.2.5 Release systems - The design and basic components of the manual and automatic release systems shall be approved by the Bureau of Naval Weapons, prior to the installation within the aircraft. The release systems shall be capable of operating satisfactorily in all climates, when subject to any ambient atmospheric temperature between minus 65 degrees Fahrenheit (minus 54 degrees Centigrade) and 160 degrees Fahrenheit (71 degrees Centigrade). The mechanism for the ejecting and inflating of the life rafts shall be capable of being operated by the following manual and automatic release systems:

3.2.5.1 Manual - The manual release system shall consist of local and remote release handles which shall be connected, by suitable means, to the compartment cover locking device and to the life raft pull cable. A pull on any release handle shall simultaneously release the compartment cover, actuate the carbon dioxide filled cylinder on the stowed life raft, thereby inflating the raft, and eject the life raft. The local and remote manual release handles may be connected in series and shall be identified and protected so that they cannot be confused with the other controls or operated inadvertently. The local and remote release handles shall be located as follows:

3.2.5.1.1 Local - The local manual release handles shall be located at each life raft compartment.

3.2.5.1.2 Remote - The remote manual release handles shall be readily accessible to the aircrew members and shall be located as follows:

(a) In the cockpit in accordance with MIL-STD-203.

(b) One at each main compartment, near the normal
 (c) in stations

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- (c) At each main emergency exit, if such exit is more than 20 feet from a point of egress having an adjacent release handle
- (d) On the outside of the aircraft, near the primary ditching escape hatch.

3.2.5.2 Automatic - The automatic release system shall consist of a salt water actuated electrical switch which permits electrical current to flow and actuate the release system thereby simultaneously release the compartment cover, activate the carbon dioxide filled cylinder on the stowed raft, which inflates the raft, and eject the life raft. The submersion actuator or the release system shall not be activated by electromagnetic radiation (HERO), oil leakage, washing down, condensation, flight and gunfire vibration, take-off, catapulting, landing, arresting, or by change in altitude.

3.2.5.2.1 Submersion actuator - The submersion actuator, when immersed in salt water, shall operate on the electrolytic principle. The actuator, upon immersion, shall close a circuit, permitting electricity to flow, and actuate the release system. The actuator shall be fitted for electrical connection with a standard AN connector conforming to MIL-C-5015. The submersion actuator shall be attached to an "always hot" bus of the primary aircraft electrical system so that the actuator is always ready to complete the circuit, by permitting electricity to flow and actuate the release system, at a time of emergency. In addition, the submersion actuator shall have its own source of power so that the actuator shall function in the event of failure of the primary aircraft electrical system. The submersion actuator shall be located inboard, in the forward area of the cockpit, at the lowest possible point below the waterline zero of the aircraft. The submersion actuator shall be identified and protected against damage and inadvertent operation. The manner of protection shall in no way interfere with the operation of the submersion actuator nor prevent its inspection.

3.2.5.2.2 Release system - The release system, when actuated by the submersion actuator, shall, with proper linkage, simultaneously release the compartment cover, actuate the stowed life raft's carbon dioxide filled cylinder, thereby inflating the raft, and eject the life raft. The release system shall consist of any or a combination of the following systems: gaseous, pyrotechnic, ballistic, pneumatic, hydraulic, or electrical.

3.2.5.2.3 Electrical installation - The electrical installation of the automatic release system shall conform to MIL-E-7080. Where equipment is subject to removal for inspection or servicing, quick disconnect connectors, conforming to MIL-C-5015, shall be used.

3.2.5.2.4 Operating voltage - The operating voltage of the automatic release system shall be compatible with the primary electrical system of the aircraft.

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3.2.5.2.5 Continuity of the electrical system - The continuity of the electrical system shall be capable of being determined with a standard continuity tester and without operating the automatic release system.

3.2.5.3 Release connections - The entire mechanism of the manual and automatic systems, when operated by any method, shall not foul upon operation and shall automatically and completely disconnect the release connections, after the compartment cover has released and the carbon dioxide filled cylinder on the stowed life raft has been actuated. The compartment cover or any component of the manual or automatic release systems shall not interfere with the ejection of the life raft or with the life raft once it has been ejected. The mechanism shall be installed in such a manner as to obtain a satisfactory ratio between the maximum stroke of the release system (18 inches) and the amount of travel required to simultaneously release the compartment cover, actuate the stowed life raft's carbon dioxide filled cylinder, thereby inflating the raft, and eject the life raft.

3.2.6 Raft stowage - The rafts and related emergency equipment shall be as specified by the Bureau of Naval Weapons. The rafts, survival equipment, and emergency radios shall be stowed and attached together by a 10 foot line of the nylon cord conforming to MIL-C-5040, Type III. The life raft shall be folded and stowed with the equipment and radio in such a manner as to assure satisfactory ejection and inflation without damage or fouling upon operation of the mechanical or automatic release system. The equipment and radio shall be stowed in a manner so as not to obstruct the inflation and ejection of the life raft.

3.2.7 Life raft attachment - The life raft shall be attached to the compartment by means of an attaching line. The attaching line shall consist of a cord with a snap hook on each end. The cord, when inspected as specified in 4.3.1, shall have a breaking strength between 75 and 90 pounds. An easily operative, non-corrosive snap hook, of a strength consistent with the cord and quick release pin, shall be attached to each end of the cord to permit manual disconnection. The snap hook shall not be snapped directly to the life raft life line, but shall be looped around the life line and snapped back on the cord. One end of the cord shall be attached to the life raft life line at the bow and the other end shall be attached to one end of a quick release pin which shall be retained, at the opposite end, by the compartment. The retention device, for the attachment of the quick release pin to the compartment, shall be of a strength greater than the force required for the separation of the quick release pin. When inspected as specified in 4.3.2, the quick release pin shall separate, with a pull, between 70 to 90 pounds, without damage to the quick release pin. The length of the attaching line will vary with the design of the aircraft. The length of the line shall be sufficient to permit the life raft to float on the surface of the water, in the event of emergency ditching of the aircraft.

3.2.8 Engineering data - Engineering drawings and other data required by the detail specification for a particular aircraft shall include the following, which

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shall be approved by the Bureau of Naval Weapons:

- (a) Location of all the life raft compartments in the aircraft.
- (b) Location of one compartment in the aircraft from which the life raft and emergency equipment can be removed to the inside of the aircraft, while in flight, for dropping to effect rescue.
- (c) Design of the cover and locking device.
- (d) Provisions for the removal of the compartment cover for inspection of the life raft and equipment without operating the aircraft release systems and the stowed life raft's carbon dioxide filled cylinder.
- (e) Design of the local and remote manual release systems and force and amount of travel required to operate each manual release.
- (f) Design of the basic components of the automatic release system.
- (g) Description of the electrical installation.
- (h) Decalcomania instructions.
- (i) Length and strength of the life raft attaching line, composition and design of the snap hooks, and the pull force required to separate the quick release pin.
- (j) Internal volume of each life raft compartment.

3.4 Interchangeability - All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance.

3.5 Performance inspections -

3.5.1 Manual release system -

3.5.1.1 Local - When inspected as specified in 4.3.4.1, each local manual release system handle shall operate with a single pull not exceeding 50 pounds and with a maximum travel of 18 inches to simultaneously release the compartment cover, actuate the stowed life raft's carbon dioxide filled cylinder, thereby inflating the raft, and eject the life raft from the compartment.

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3.5.1.2 Remote - When inspected as specified in 4.3.4.2, each remote manual release handle shall operate with a single pull not exceeding 50 pounds and with a maximum travel of 18 inches to simultaneously release the compartment cover, actuate the stowed life raft's carbon dioxide filled cylinder, thereby inflating the raft, and eject the life raft from the compartment.

3.5.2 Automatic release system - When inspected as specified in 4.3.5, the submersion actuator shall close the circuit, thereby permitting electricity to flow, and operate the release system. The release system shall simultaneously release the compartment cover, actuate the stowed life raft's carbon dioxide filled cylinder, thereby inflating the raft, and eject the life raft from the compartment. The compartment cover shall be released and the stowed life raft's carbon dioxide filled cylinder shall be actuated in a maximum time of 5 seconds from the instant the submersion actuator has been immersed in the saline solution.

3.5.3 Extreme temperatures - When inspected as specified in 4.3.6, the manual and automatic release systems shall function as specified in 3.5.1 thru 3.5.2, as applicable.

3.6 Marking -

3.6.1 Identification of the manual release controls and submersion actuator - The manual release controls and the submersion actuator shall be marked for identification, in accordance with MIL-M-18012, so that they shall not be confused with any of the other controls.

3.6.2 Decalcomania instructions - Decalcomania instructions containing the life raft pull cable and compartment cover release hook-up and the installation procedure for the folded life raft shall be installed on the inside of each compartment cover. The decals shall conform to MIL-D-8635, Type II.

3.7 Workmanship - The release systems, including all the parts and accessories, shall be so constructed and finished that they shall be free from all defects which may affect proper functioning in service. Particular attention shall be given to neatness and thoroughness of soldering, marking of the parts and assemblies, welding and brazing, plating, painting, riveting, machine screw assemblies, and freedom of parts from burrs and sharp edges. The release systems shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the acceptance criteria established herein.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable

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to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Quality conformance inspection - The sampling and inspection levels shall conform to MIL-STD-105. The quality conformance inspection shall consist of the following:

Strength of the life raft attaching line cord
Force to separate the quick release pin
Visual examination
Manual release
Automatic release

4.2.1 Sampling for tests and examinations of the attaching line cord, quick release pin, and the release systems - The sample size, acceptance criteria, tests and examinations required for the attaching line cord, quick release pin, and the release systems shall be as specified in Table I.

TABLE I

SAMPLE SIZE, ACCEPTANCE CRITERIA, TESTS, AND EXAMINATIONS OF THE ATTACHING LINE CORD, QUICK RELEASE PIN, AND THE RELEASE SYSTEMS

INSPECTION	CLASSIFICATION OF CHARACTERISTIC	PARAGRAPH		SAMPLE SIZE	ACCEPTANCE CRITERIA
		REQUIREMENT	METHOD		
Strength of the life raft attaching line cord <u>1</u> /	Major	3.2.7	4.3.1	Inspection Level S-2 <u>2</u> /	Acceptance number zero, rejection number 1
Force to separate the quick release pin <u>1</u> /	Major	3.2.7	4.3.2	Inspection Level S-2 <u>2</u> /	Acceptance number zero, rejection number 1
Visual examination	Major	- -	4.3.3	Every compartment and release system	Reject all units with any defect

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TABLE I (Continued)

INSPECTION	CLASSIFICATION OF CHARACTERISTIC	PARAGRAPH		SAMPLE SIZE	ACCEPTANCE CRITERIA
		REQUIREMENT	METHOD		
Manual Release	Major	3.5.1 through 3.5.1.2	4.3.4 through 4.3.4.2	Every local and remote manually controlled release handle	Reject all defective units
Automatic Release	Major	3.5.2	4.3.5	Every actuator switch	Reject all defective units

1/ This inspection shall be performed either at the contractor's or sub-contractor's plant.

2/ The sample size shall be based only on the applicable sample size code letter corresponding to the specified inspection level of MIL-STD-105.

4.3 Inspection methods -

4.3.1 Strength of the life raft attaching cord - The breaking strength of the life raft attaching cord shall be determined in accordance with CCC-T-191, Method 4102.

4.3.2 Force to separate the quick release pin - The upper portion of the quick release pin shall be securely attached to the upper jaw and the lower portion securely attached to the lower jaw of a suitable inspection apparatus. The rate of jaw separation shall be a maximum of one inch per minute during the inspection.

4.3.3 Visual examination - Every release system and compartment shall be examined visually to determine conformance to this specification. The list of defects, Table II, shall be used to enumerate the defects found.

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TABLE II

LIST OF DEFECTS FOR VISUAL EXAMINATION OF THE
RELEASE SYSTEMS AND COMPARTMENTS

DEFECT	
1.	Surface rough, misaligned, or contains nicks, cracks, burrs, embedded foreign matter, loose particles, sharp edges, or other flaws.
2.	Any finish missing or any component improperly finished.
3.	Any component loose, detached, not as specified, or otherwise not securely retained.
4.	Any component missing, malformed, corroded, fractured, or otherwise damaged.
5.	Any required operation omitted, improperly performed, or any component incorrectly assembled.
6.	Any identification or decalomania markings missing, incorrect, illegible, incomplete, or improperly located.
7.	Any functioning part that works with difficulty.

4.3.4 Manual release system - The manual release system inspection shall be conducted at an atmospheric pressure of 28 to 32 inches of mercury, at a temperature of 77 ± 18 degrees Fahrenheit (25 ± 10 degrees Centigrade), and a relative humidity of 80 percent or less.

4.3.4.1 Local - Each local manual release system handle shall be operated with a single pull, to determine conformance with 3.5.1.1. The force required to pull any local manual release handle and the length of travel, to cause the system to operate, shall be determined by any suitable means.

4.3.4.2 Remote - Each remote manual release system handle shall be operated with a single pull to determine conformance with 3.5.1.2. The force required to pull any remote manual release handle and the length of travel, to cause the system to operate, shall be determined by any suitable means.

4.3.5 Automatic - The inspection of the automatic release system shall be conducted under the conditions as specified in 4.3.4. The submersion

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actuator shall be immersed in a 3 percent saline solution (3 percent sodium chloride and 97 percent distilled water), at a temperature of 30 ± 2 degrees Fahrenheit (minus 1 ± 1 degree Centigrade), to determine conformance with 3.5.2. The amount of time, from the instant the submersion actuator is immersed in the saline solution until the compartment cover is released and the stowed life raft's carbon dioxide filled cylinder is actuated shall not exceed 5 seconds.

4.3.6 Extreme temperatures - The manual and automatic release systems shall be inspected as specified in 4.3.4.1 through 4.3.5, except that it shall be conducted at the high and low temperatures specified in the detail specification for a particular aircraft. The performance of the manual and automatic release systems at the extreme temperatures shall be determined during the evaluation period of the aircraft.

5. PREPARATION FOR DELIVERY

5.1 Not applicable -

6. NOTES

6.1 Intended use - The requirements specified herein are intended for use by manufacturers for the installation of manual and automatic operated release systems for the inflation and ejection of life rafts from patrol and transport series Naval aircraft.

6.2 Ordering data - Not applicable.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).

SPECIFICATION MIL-R-18370A(WP) RELEASE SYSTEMS FOR THE EJECTION OF LIFE RAFTS
FROM NAVAL PATROL AND TRANSPORT SERIES AIRCRAFT. DESIGN REQUIREMENTS FOR

ORGANIZATION (Of submitter)

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

MATERIAL PROCURED UNDER A

DIRECT GOVERNMENT CONTRACT

SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

YES

NO

IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional sheets, attach to form and place both in an envelope, which should be marked "REMARKS".)

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