MIL-A-23121C(AS)
23 June 1970
SUPERSEDING
MIL-A-23121B(AS)
11 March 1968

MILITARY SPECIFICATION

AIRCREW ENVIRONMENTAL, ESCAPE AND SURVIVAL COCKPIT CAPSULE SYSTEM; GENERAL SPECIFICATION FOR

This specification has been approved by the Naval Air Systems Command, Department of the Navy.

1. SCOPE

This specification establishes the general requirements for the design, construction, installation, and performance of aircraft cockpit capsule aircrew environmental, escape and survival systems.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

L-P-383	Plastic Material, Polyester Resin, Glass Fiber Base, Low Pressure Laminated
QQ-C-320	Chromium Plating (Electrodeposited)
QQ-M-40	Magnesium Alloy Forgings
QQ-P-416	Plating, Cadmium (Electrodeposited)

FSC 1680

<u>Military</u>

MIL-P-514	*Plate, Identification, Instruction and Marking, Blank*
MIL-D-1000	Drawings, Engineering and Associated Lists
MIL-D-1000/1	Drawings, Engineering and Associated Data
MIL-M-3171	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on
MIL-S-5002	Surface Treatments and Metallic Coatings for Metal Surfaces of Weapons Systems
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for
MIL-C-5541	Chemical Films and Chemical Film Materials for Aluminum and Aluminum Alloys
MIL-C-6021	Casting, Classification and Inspection of
MIL-H-6088	Heat Treatment, Aluminum Alloys
MIL-C-006730	Lighting Equipment, Exterior, Installation of Aircraft (General Specification)
MIL-M-6857	Magnesium Alloy Castings, Heat Treatment of
MIL-I-6870	Inspection Requirements, Nondestructive, for Aircraft Materials and Parts
MIL-H-6875	Heat Treatment of Steels (Aircraft Practice), Process for
MIL-F-7179	Finishes and Coatings, General Specification for Protection of Aerospace Weapons, Structures and Parts
MIL-F-7190	Forgings, Steel, for Aircraft and Special Ordnance Applications

Military (Continued)

MIL-C-007438	Core Material, Aluminum, for Sandwich Construction
MIL-T-7755	Trainers, Naval Air Mobile (Maintenance), Equipment and Services, General Specification for
MIL-S-7811	Sandwich Construction; Aluminum Alloy Faces, Aluminum Foil Honeycomb Core
MIL-C-7958	Controls, Push-Pull, Flexible and Rigid
MIL-A-8064	Actuators and Actuating Systems, Aircraft, Electro-mechanical, General Requirements for
MIL-C-8073	Core Material, Plaster Honeycomb, Laminated Glass Fabric Base, for Aircraft Structura Applicationsl
MIL-I-8500	Interchangeability' and Replaceability of Component Parts for Aircraft and Missiles
MIL-S-8516	Sealing Company, Synthetic Rubber, Electric Connectors and Electric Systems, Accelerator Required
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-D-8634	Decal, Elastomeric Pigmented Film, for Use on Exterior Surfaces
MIL-M-8650	Mockups, Aircraft Construction of
MIL-A-8860	Airplane Strength and Rigidity, General Specification for
MIL-A-8861	Airplane Strength and Rigidity, Flight Loads
MIL-A-8862	Airplane Strength and Rigidity, Landplane Landing and Ground Handling Loads
MIL-A-8863	Airplane Strength and Rigidity, Additional Loads for Carrier - Based Landplanes
MIL-A-8865	Airplane Strength and Rigidity, Miscellaneous Loads

Military (Continued)

MIL-A-8866	Airplane Strength and Rigidity, Reliability Requirements, Repeated Loads, and Fatigue
MIL-C-8779	Color, Interior, Aircraft., Requirements for
MIL-A-9067	Adhesive Bonding, Process and Inspection Requirements for
MIL-E-9426	Escape Systems, Requirements Conformance Demonstrations and Performance Tests for; General Specification for
MIL-M-18012	Markings for Aircrew Station Displays, Design and Configuration of
MIL-C-18263	Colors, Exterior, Naval Aircraft, Requirements for
MIL-F-18264	Finishes, Organic, Weapons System, Application and Control of
MIL-I-18464	Insignia and Markings for Naval Weapons Systems
MIL-E-18927	Environmental Systems, Pressurized Aircraft, General Requirements for
MIL-P-19834	Plate, Identification, Aluminum Foil, Adhesive Backed Modification Applied
MIL-A-21180	Aluminum - Alloy Castings, High Strength
MIL-D-21625	Design and Evaluation of Cartridges for Cartridge Actuated Devices
MIL-R-22659	Radio Sets, AN/ARC-51 (*) and AN/ARC-51X(*)
MIL-P-23460	Pin, Quick Release, Positive Locking
MIL-S-23586	Sealing Compound, Electrical Silicone Rubber, Accelerator Required
MIL-D-23615	Design and Evaluation of Cartridge Actuated Devices
MIL-I-23659	Initiators, Electric, Design and Evaluation of

Military (Continued)

MIL-D-23890	Decalcomanias, Process for Application of
MIL-P-24014	Preclusion of Hazards from Electromagnetic Radiation to Ordnance, General Requirements for
MIL-M-24041	Molding and Potting Compound Chemically Cured, Polyurethane (Polyether-Based)
MIL-4-25165	Aircraft Emergency Escape System, Identification of
MIL-A-25463	Adhesive, Metallic Structural Sandwich Construction
MIL-D-38015	Destruct Subsystem, General Requirements for
MIL-H-81200	Heat Treatment of Titanium arid Titanium Alloys
MIL-M-81203	Manuals, Technical, In-Process Review, Validation and Verification Support of
MIL-C-81467	Chaff, Countermeasures RR-129/ALE-29A
MIL-D-81514	Device, Restraint Harness Take-Up, Inertia-Locking Powered-Retracting; General Specification for
MIL-V-81523	Vest, Survival Equipment, Type SV-2
MIL-A-81573	Aircrew Escape System Descriptive and Performance Data Presentations, Requirements and Formats for; General Specification for
MIL-L-81561	Life Preserver, Inflatable, Aircrewman Type LPA-1
MIL-A-815173	Aircrew Escape System Descriptive and Performance Data Presentations, Requirement and Formats for; General Specification for
MIL-C-81590	Cockpit Canopy System, Fixed Wing Single and Multiplace, Fighter, Attack, and Trainer Aircraft, General Specification for
MIL-T-82341	Trainer, Ejection Seat, Aircraft; General Specification for

Military (Continued)

MIL-C-83125	Cartridges for Cartridge Actuated Propellant Actuated Devices, General Design Specification for
MIL-S-83490	Specifications, Types and Forms
AD 42	Naval Air Systems Quality Assurance Procedures, Requirements for Preparation of
AR 22	Format and Content of Formal Technical Directives
AR 47	Technical Information Requirements for Automated Aircrew Systems Proposals
AR 49	Automated Aircrew Escape Systems Reliability and Maintainability (R/M) Program: Requirements for
AS 1578	Rocket Motors and Rocket Catapults for Use in Aircrew Escape Systems, General Specification for
AS 2556	Data, Technical for Rocket Motors and Rocket Catapult Used in Aircrew Escape Systems
WR 43	Preparation of Quality Assurance Provisions (Including Classification of Characteristics)
WR 62	Naval Weapons Requirements Specifications and Standards; Use of

STANDARDS

Federal

FED-STD-406	Plastics: Methods of Testing
FED-STD-595	Colors

Military

MIL-STD-143	Specifications and Standards, Order of Precedence for the Selection of
MIL-STD-210	Climatic Extremes for Military Equipment
MIL-STD-401	Sandwich Constructions and Core Materials; General Test Methods

Military (Continued)

MIL-STD-411	Aircrew Station Signals
MIL-STD-490	Specification Practices
MIL-STD-838	Lubrication of Military Equipment
MIL-STD-849	Inspection Requirements, Definitions and Classification of Defects for Parachutes
MIL-STD-850	Aircrew Station Vision Requirements for Military Aircraft
MIL-STD-882	System Safety Program for Systems and Associated Subsystems and Equipment; Requirements for
MIL-STD-889	Dissimilar Metals
MIL-STD-1166	Radiographic Testing Requirements for Solid Propellants
MIL-STD-1314	Safety Precautions for Explosive-loaded Items
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment. and Facilities

PUBLICATIONS

Department of Defense

MIL-HDBK-5	Metallic Materials and Elements for Aerospace Vehicle Structures
MIL-HDBK-17 (Part I)	Plastics for Flight Vehicles, Reinforced Plastic
MIL-HDBK-23	Structural Sandwich Composites
H 50	Evaluation of a Contractor's Quality Program
H 51	Evaluation of a Contractor's Inspection System

Department of Defense (Continued)

MIL-HDBK-52	Evaluation of a Contractor's Calibration System
H 53	Guide for Sampling Inspection
H 55	Radiography Nondestructive Testing Series
H 109	Statistical Procedures for Determining Validity of Suppliers Attributes by Inspection
MIL-HDBK-132	Protective Finishes
MIL-HDBK-691	Adhesives
MIL-HDBK-693	Magnesium and Magnesium Alloy
MIL-HDBK-694	Aliminum and Aluminum Alloys
MIL-HDBK-700	Plastic

Air Force Specification Bulletin

AFBU 526	Contaminants, Cabin Air, Maximum Allowable Concentration of

Air Force - Navy Aeronautical Bulletins

ANA Bulletin No. 147	Specifictions and Standards of Non-Government organizations Released fur Flight Vehicle Construction

Naval Air Systems Command

SD-24	General Specification for Design and Construction of Aircraft Weapon Systems
XAV-111	Emergency Rescue Beacon AN/ PPT-(*)

REPORTS

Report No.

NAEC-ACED Report No. 335	Investigation, Design, and Development of an F7U-3 Ejection Seat Energy Absorption System for Reduction of Crash Force-Loads

Report No. (Continued)

NAEC-ACEL Report No. 533	Anthropometry of Naval Aviators -1964 (DDC No. AD 626322)
NAVAIR 00-23-524	Guide to the Reduction of Aircraft Vulnerability
NAVAIR 11-100-1	Cartridges and Cartridge Actuated Devices for Aircraft and Associated Equipment
NAVAIR Report No. 7836	Power Cartridge Handbook

(When requesting any of the applicable documents, refer to both title and number. All requests should be made via the cognizant Government quality assurance 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 Publications and Forms Center (Code 1051), 5801 Tabor Avenue, Philadelphia Pennsylvania 19720. All other documents should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated the issue in effect on date of invitation for bids or request for proposal shall apply.

National Aerospace Standard

NAS 1091 Streamer Assembly, Warning

(Application for copies should be addressed to the Aerospace Industries Association of America, Inc., 1725 DeSales Street N.W., Washington, D. C. 20036.)

National Academy of Sciences - National Research Council

Report of Working Group 57, National Academy of Sciences - National Research Council, Committee on Hearing, Bioacoustics, and Biomechanics (CHABA), July 1968, "Proposed Damage-Risk Criterion for Impulse Noise (Gunfire)"

(Application for copies should be addressed to the National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.)

3. REQUIREMENTS

3.1 Selection of materials and standard parts. The selection of materials, standard parts, processes, corrosion protection, and design features significant in adequate corrosion behavior shall be in accordance with the requirements of Naval Air Systems Command Design Specification SD-24.

3.1.1 Materials. Materials shall conform to applicable specifications and shall be as specified herein and on applicable drawings. Materials which are not covered by government specifications, or which are not specifically described herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purpose intended, and shall be approved by the Government procuring activity. Particular care shall be given to close fitting parts in the choice of both materials and corrosion practicess.

3.1.1.1 Metal parts. All metal parts shall be of the corrosion-resistant type or treated in a manner to render them resistant to corrosion. Unless suitably protected against electrolytic corrosion in accordance with 3.1.2, dissimilar metals, as defined in MIL-STD-889, shall not be used in contact with each other. General design information governing usage of metals is furnished in MIL-HDBK-5. General design information for aluminum and aluminum alloys is provided in MIL-HDBK-694.

3.1.1.1.1 Heat treatment. Heat treatment of aluminum parts and steel parts shall be in accordance with MIL-H-6088 and MIL-H-6875, respectively. Heat treatment of magnesium alloy castings shall be in accordance with MIL-M-6857. Heat treatment of titanium and titanium alloy parts shall be in accordance with MIL-H-81200.

3.1.1.1.2 Castings. Castings used in the escape system shall conform with requirements of MIL-C-6021. In addition, aluminum alloy castings shall conform to the requirements of MIL-A-21180.

3.1.1.1.3 Steel forgings. Steel forgings used in the escape systems shall conform to the requirements of MIL-F-7190. Critical steel forgings shall meet the requirements for MIL-F-7190 Grade A forgings.

3.1.1.1.4 Magnesium and magnesium alloys. Magnesium and magnesium alloy parts shall not be used without the express approval of the Government procuring activity. The contractor shall describe the intended application, protective measures planned and the composition of parts adjacent to the proposed usage. General design information for magnesium and magnesium alloys is presented in MIL-HDBK-693.

3.1.1.1.4.1 Magnesium alloy forgings. Magnesium alloy shall conform to the requirements of QQ-M-40.

3.1.1.2 Sandwich construction. General design information concerning the design, manufacture and usage of sandwich construction is furnished in MIL-HDBK-23. Aluminum and aluminum alloy sandwich construction shall comply with the requirements of MIL-S-7811.

3.1.1.2.1 Core materials. Core material and construction used in sandwich construction shall conform to the requirements of MIL-C-007438 or MIL-C-8073. Use of other core materials shall be subject to Government procuring activity approval and shall be in consonance with the guidelines furnished in MIL-HDBK-23. Wood cores shall not be used.

3.1.1.2.2 Bonding agents and methods. Adhesives used to bond aluminum core material and to bond aluminum facings shall conform to the requirements of MIL-A-25463. Bonding agents used to bond non-aluminum or non-aluminum alloy cores to aluminum, aluminum alloy or other face materials shall be in consonance with the guidance provided in MIL-HDBK-23 and shall be subject to approval by the Government procuring activity. The bonding processes employed shall conform to the requirements of MIL-A-9067. General guidance concerning adhesive bonding principles, selection of adhesives, preparation of surfaces to be bonded, application and curing of adhesives, and the inspection and testing of adhesive bonds are presented in MIL-HDBK-691.

3.1.1.2.3 Sealing sandwich construction. Sandwich construction shall be sealed to preclude entrance of moisture into the core material.

3.1.1.3 Non-metallic components. Non-metallic components shall be designed to minimize deterioration caused by abrasion and/or exposure to sunlight, microorganisms, moisture, heat, fuel, hydraulic and lubricating oil and grease, and salt spray. Protection shall be provided for those non-metallic components, particularly nylon lines, for which strength degradation associated with abrasion or exposure-induced deterioration can endanger the system user(s).

3.1.1.3.1 Reinforced plastic construction. General design and manufacturing information concerning reinforced plastic construction is furnished in MIL-HDBK-17, Part I, and MIL-HDBK-700. Fiberglass materials used in the escape system shall be in accordance with the requirements of L-P-383 for Type I reinforced plastic construction and shall be of such character and quality as to be capable of withstanding all service conditions (including escape), as herein specified, without degrading the performance of the component or system in a manner likely to cause injury to the crewmember, damage to his flight environmental protective garments and/or survival equipments, and/or reduce the escape capability furnished by the escape system.

3.1.1.4 Lubrication. Lubricants and lubrication practices shall conform to the requirements of MIL-STD-838. Lubricants shall function satisfactorily throughout the temperature range from -65° F to +160° F. Choice of lubricants shall (a) reduce the hazards to non-metallic escape system components, (b) reduce damage to finishes adjacent to location of lubricant application, and (c) eliminate the need for frequent relubrication by field maintenance activities. If relubrication is required, choice of lubricants and practices should be such that relubrication need be accomplished only during progressive aircraft rework (PAR) periods.

3.1.1.5 Hydraulic fluids. Hydraulic fluids used in escape systems components shall function satisfactorily throughout the temperature range from -65° F to +160° F and shall be nonflammable, noncorrosive, nontoxic, and inorganic in nature and shall be approved by the Government procuring activity for use in escape system applications.

3.1.1.6 Fungus-proof materials. To the greatest extent practicable, the materials used in the escape system shall not be nutrients for fungi. If materials that are nutrients for fungi must be utilized, such materials shall be treated with a fungicidal agent approved by the Government procuring activity.

3.1.1.7 Decalcomanias. Decalcomanias used on the escape system shall conform to the requirements of MIL-D-8634. General guidance for the application of decalcomanias is provided in MIL-D-23890.

3.1.1.5 Identification, instruction and marking plates. Identification, instruction and marking plates shall meet the requirements for MIL-P-514, Composition A, Class 2: Composition C or Composition D, as applicable. Unless otherwise directed by the Government procuring activity the predominating color of the plates shall be black, FED-STD-595 color number 17038, with white lettering. Attachment of the plates shall be in accordance with MIL-P-514.

3.1.1.9 Potting compounds. Potting compounds employed in the aircrew escape system shall be selected from those listed on the Qualified Products List for MIL-S-8516, MIL-S-23586 and MIL-M-24041 and which have completed tests to the Government procuring activity's satisfaction to demonstrate their hydrolytic stability.

3.1.2 Corrosion protection. Corrosion protective practices employed in the manufacture of the aircrew escape system and its components shall be in accordance with MIL-STD-889 for dissimilar metals and with the MIL-F-7179 requirements for exterior surfaces. Magnesium alloy parts shall be treated in accordance with the MIL-M-3171 requirements for Type VII Treatment, including surface sealing.

3.1.2.1 Finishes. Protective coatings and finishes shall not crack, chip, or scale during normal service life, or in the herein specified extrems of atmospheric conditions. Surface treatments, coatings and finishes shall conform to

MIL-S-5002, or surface treatments herein specified. General guidance in the application and control of organic finishes is provided in MIL-F-18264 and in MIL-HDBK-132.

3.1.2.2 Anodizing. All aluminum and aluminum alloy parts, except those subject to wear or falling under the provisions of 3.1:2.2.1, shall be anodized in accordance with MIL-A-8625, Type II anodic coating. Anodic coatings for all aluminum and aluminum alloy parts subject to wear shall conform to MIL-A-8625, Type III, except for parts which are expensive and would normally be reworked during overhaul. For these parts, chromium plating in accordance with QQ-C-320 shall be used.

3.1.2.2.1 Chemical surface treatment. For aluminum and alumimum alloy parts not subject to wear, abrasion or erosion, chemical conversion surface treatment in accordance with MIL-C-5541 may be used in lieu of anodizing.

3.1.2.3 Plating. Steel parts in contact with aluminum or aluminum alloys shall be cadmium plated in accordance with QQ-P-416, Type II, Class 1.

3.1.3 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143 and WR 62. A partial listing of approved (MIL-STD-143 Group II) non-government organization specifications and standards is furnished in ANA Bulletin No. 147.

3.1.4 Drawings. Drawing requirements shall be specified by the procuring activity in accordance with MIL-D-1000/1 instructions. Generally all categories of drawings established in MIL-D-1000 will be required. Unless otherwise directed by the Government procuring activity, all drawings shall conform to the requirements established in MIL-D-1000 for Form 2 Drawings.

3.2 General design requirements. The cockpit capsule system shall be designed as a 'shirt-sleeve' environment concept which will enhance efficiency and comfort of aircrew under all conditions of mission profile. The design shall include an integrated environmental, escape, and survival capability for crew members and shall provide:

(a) Fully automated survivable escape for all aircrewmen irrespective of percentile accommodation limits or position within the aircraft throughout the aircraft 3-axis "g" field and throughout the escape system performance envelope specified in Table I and throughout the entire fright envelope of the aircraft up to, and including, V_t. An aircraft personnel escape system must return the aircrewmen to earth, or water, in such condition that each individual is able to undertake the tasks associated with the survival and/or enemy evasion phases of his escape.

(b) Completely automatic functioning of all components and systems after actuation of a single escape system firing control.

(c) Comfortable and adequate support and retention of the seat occupant's body under all conditions of flight throughout the aircraft perform ance envelope, including takeoff and landing.

(d) Automated escape under submerged conditions as specified herein without compromising other specified escape performance.

Particular attention shall be directed to the development of optimum configuration, integration, overall system reliability, accessibility to critical components, safety, and maintainability. Consideration also shall be given to designing the escape system and its subsystems and components in a manner to reduce their vulnerability to combat damage. Vulnerability reduction design principles are enumerated in NAVAIR 00-25-524.

3.2.1 Human factors. General design requirements shall be in accordance with MIL-STD-1472 and the following:

(a) Crewmember accommodation. The seat and crew station shall accommodate 3rd through 98th percentile crewmen, wearing applicable personnel protective equipment and shall provide a comfortable condition in which the efficiency and effectiveness of the aircrewmen are optimized. All antropometric data for the 3rd through 98th percentile aircrewmen shall be in accordance with NAEC-ACEL Report No. 533.

(b) Cockpit compatibility. The design of the aircrew escape system seat shall be compatible with the aircrew station in which the seat shall be installed. Individual 3rd through 98th percentile aircrewmen, throughout the range of seat adjustment and while rest rained in the full back position by the restraint system, shall be able to reach and fully actuate and/or manipulate all aircraft emergency controls assigned to, and located within their respective aircrew stations. The extremes of functional reach for the 3rd percentile shoulder height (seated) aircrewmen shall be considered to be the 3rd and 70th percentiles (functional reach), and for the 98th percentile shoulder height (seated) aircrewmen shall be considered to be the 30th and 98th percentiles (functional reach). In addition, when the seat is adjusted to raise the occupant's eye level to the aircraft design eye position, 3rd through 98th percentile (eye height, sitting) aircrewmen shall be able to actuate all normal aircraft and/or equipment controls assigned to, or located in, their individual aircrew stations. Location of the seat in relationship to other aircraft equipment shall permit ready ingress to, and egress from the seat by aircrewmen. This location shall not hinder emergency manual escape from the aircraft by aircrewmen with - applicable equipment.

(c) Escape system controls. Design and placement of escape system controls shall not jeopardize the safety of the aircrewmen actuating those controls to which he has been assigned access. Nor shall the design and/or placement of escape system controls hinder emergency manual escape from the aircraft by the fully equipped aircrewmen. Throughout the entire range of vertical and fore-and-aft seat adjustment, and while restrained in the full back position by the restraint system, all 3rd through 98th percentile (sitting height) crewmen shall be able to reach and fully accurate their escape system controls. The extremes of functional reach for the 3rd percentile shoulder height (seated) aircrewmen shall be considered to be the 3rd and 70th percentiles (functional reach), and for the 98th percentile shoulder height (seated) aircrewman shall be considered to be the 30th and 98th percentiles (functional reach).

(d) Escape system operation. Operation of the escape system shall not cause degradation of the crewman's capability to undertake the survival and/or enemy evasion phases of his escape.

(e) Field of vision. The seat(s) and other portions of the escape system shall be designed and installed to minimize degradation of crewmember fields of vision. The effect of each seat and other system components upon the field of vision for each crew station shall be depicted upon field of vision plots in accordance with the procedure established by MIL-STD-850. Plots shall be made for the crewman's eye located at the design eye position with all other seats in full up seat vertical adjustment.

(f) Impulse noise levels. The impulse noise levels associated with the operation of the escape system, and measured at the ears of a 50th percentile aircrewman seated with his eyes at the design eye position in each aircrew station, shall not exceed the damage risk criterion proposed in the Report of Working Group 57, National Academy of Sciences - National Research Council Committee on Hearing Bioacoustics, and Biomechanics (CHABA), July 1968, for impulse noise of B-duration type. Since the probable maximum exposure of any aircrewman to repeated-impulse noise is limited to a minimal number of impulses occurring during the operation of the escape system, the damage risk criterion may be corrected to permit an additional 10dB. If all crewmen will be equipped with APH-5 or APH-6 helmet with Gentex Sonic ear cups (or ear protection deemed by the Government procuring activity to be equivalent), an additional correction may be made to the damage risk criterion to permit an increase of 20dB.

(g) Cabin air contamination. Operation of the escape system and/or any of the associated subsystems shall not cause the release of toxic and/or noxious elements/gases into the crew spaces in concentrations sufficient to be injurious to crewmembers or sufficient to degrade crewmember capability to undertake and perform survival and/or enemy evasion tasks. During operation of the aircraft, concentration of toxic and/or noxious elements/gases in the cabin air shall not exceed levels considered safe for continuous exposures of eight hours duration. Maximum allowable concentrations for many such elements/gases likely to be introduced through engine bleed air type cabin ventilation and pressurization systems are presented in U. S. Air Force Specification Bulletin 526.

(h) Crash loads. Vertical acceleration loads imposed upon the crewman shall be maintained within safe physiological limits for crash conditions specified herein.

(i) Personal equipment. The crewmembers shall not be required to wear any equipment except underwear, lightweight flying suits or anti-g suits, lightweight boots, and crash helmets with or without communication equipment. The crewmembers will not wear pressure suits, ventilation suits, exposure suits, or life preservers, and provisions shall not be made for personal parachutes.

3.2.2 General service environmental conditions. Inasmuch as cockpits, particularly those in which access is obtained through opening the canopy, frequently are open for extended periods to permit performance of maintenance tasks, to provide access for manning, during manned on-deck readiness periods, and for other reasons; the cockpit furnishings and cockpit subsystems are exposed to an extreme range of environmental conditions normally associated with externally located equipments. The escape systems shall be capable of withstanding with a minimum of upkeep and of operating following storage in, or during use in, the following climatic extremes specified in MIL-STD-210 for each of the seven spheres of operation as defined in 1.2 of MIL-STD-210:

(a) 2.1, Probable Hot Thermal Extremes.

(b) 2.2, Probable Cold Thermal Extremes.

(c) 2.3, Probable High Humidity Extremes.

(d) 2.4, Probable Low Humidity Extremes.

(e) 2.8.2, Blowing Sand.

(f) 2.8 .3. Blowing Dust.

(g) 2.9, Extreme Atmosphere Pressure

In addition, environmental conditions will include salt spray/fog, condensate and flue gases.

3.2.3 Cockpit/crew station design. Cockpit/crew station design shall conform to the requirements of SD-24 except where otherwise required herein.

3.2.3.1 Sharp projections. Particular attention shall be given to the elimination of sharp corners and excessive projections conducive to injury of aircrew or maintenance personnel. The display panels in f rent of the aircrew shall be as smooth as practicable. Control handles and knobs shall be recessed flush with the display panels or suitably protected to prevent injury to aircrewmen and shall be capable of being operated with a gloved 98th percentile hand. Energy attenuation padding shall be utilized when necessary to prevent injury to the aircrew during the escape or crash situation.

3.2.4 Aircraft forward fuselage loads carry-through structure. As much as practicable, forward fuselage loads carry-through structure shall not pass into or through the cockpit capsule structure. Location and design of nose gear should not require reaction of nose gear loads by cockpit capsule structure.

3.2.5 Cockpit capsule skin penetrations. Penetrations of the cockpit capsule skin shall be held to a minimum and shall be sealed so as to be airtight and watertight throughout the cockpit capsule norm al and emergency environments. Inputs to the cockpit capsule shall be grouped in a manner to facilitate efficient separation. To the maximum extent feasible, redundant services inputs shall not be placed in the same grouping.

3.2.6 Equipment attachment to cockpit capsule. No equipment, not actually a part of the cockpit capsule system, shall be attached to the outside mating surfaces of the cockpit capsule. Support equipments/bracketry for interfaces and for cable and line routing shall not be attached to the cockpit capsule external surfaces.

3.2.7 Cockpit equipments and displays. To the maximum extent feasible only the controls and displays for cockpit equipments shall be located within the cockpit capsule. The "black box" portion of the equipments/avionics should be located within the basic airframe and connected to their respective controls and displays through remote control, multiplexing, time sharing, and/or other techniques.

3.3 Specific design requirements.

3.3.1 System subsystem design. The cockpit capsule system shall include the following components/subsystems as applicable to the specific aircraft in which the system is utilized:

(a) Cockpit capsule

(b) Environmental subsystem

(1) Normal

(2) Emergency

(c) Crew seat(s)

(1) Mechanism(s) for vertical, fore-and-aft, tilt seat adjustment

(2) Torso, head and limb support and restraint

(3) Shoulder harness take-up mechanism

(4) Single point personnel restraint release subsystem

(5) Load limiters

(6) Anti-"G" protection devices

(d) Escape initiation and sequencing subsystem

(1) In-flight

(2) Underwater

(e) Capsule severance/separation subsystem

(f) Capsule propulsion subsystem

(g) Ballistic components

(h) Retardation and stabilization subsystem

(i) Parachute recovery subsystem

(j) Cockpit capsule locator subsystems

(2) Aircraft emergency IFF actuation subsystem

(3) Radio, beacon and communications

(4) Locator lights

(k) Survival subsystems

(1) Ground/water impact subsystem

(2) Flotation and self-righting subsystem

(l) Survival equipments

(1) Onboard usage

(2) Transportable

(m) Fire suppression subsystem

(n) Ground safety equipment

(o) Classified equipments destruct subsystem

3.3.1.1 Cockpit capsule. The cockpit capsule shall consist of a sealed module enclosing the cockpit crew stations and integrated with the six-craft. The cockpit capsule, during normal use throughout the aircraft flight profile, shall maintain a habitable working environment for crewmembers, thereby eliminating the necessity for the use of individual environmental protective garments. The cockpit capsule shall be capable of being separated and propelled intact from the aircraft to effect crew escape from disabled aircraft and shall protect the occupant(s) from the hostile escape environment and provide shelter and flotation as required during the survival phase of the escape.

3.3.1.1.1 Cockpit capsule integration with aircraft. The design of the cockpit capsule shall be such that it is completely integrated and compatible with the design of the. parent aircraft, taking into consideration such factors as size, shape, weight, and structural design. The performance or mission capability of the aircraft shall not be adversely affected by the integration of the cockpit capsule system. The electrical, pneumatic, hydraulic, and control system integrity of the parent aircraft shall not be penalized by the design of the cockpit capsule severance/separation system.

3.3.1.1.1.1 Normal electrical system. The normal electrical system of the cockpit capsule shall be compatible with the electrical system. of the parent aircraft. Provisions shall be made for electrical input growth.

3.3.1.1.2 Optimization of size, shape, and weight consistent with survival mission. The cockpit capsule size, shape, and weight shall be optimized so that a minimum capsule configuration consistent with the survival mission is separated from the aircraft under emergency conditions. To the maximum extent feasible the heavier portions of equipments, except of a survival escape nature, shall be located external to the cockpit capsule and only their control and display portions located in the capsule.

3.3.1.1.3 Cockpit closure and transparencies. Provisions shall be made to protect weather seals and cockpit pressurization system seals from damage as a result of normal maintenance activities and normal entrance and egress by the crew. The cockpit closure shall provide pressurization integrity consistent with the normal and emergency environmental systems specified herein. Underwater the closure shall not implode at depths less than 50 feet. All parts within 24 inches of the magnetic compass shall be constructed of non-magnetic materials. The transparency construction shall comply with the requirements of MIL-C-81590 and shall utilize transparent materials which incorporate maximum strength, toughness, and thermal properties adequate to fulfill the design criteria. Where thermal requirements allow stretched acrylic(s), a composite incorporating stretched acrylics shall be considered. Materials other than those specified in Naval Air Systems Command General Design Specification SD-24 and MIL-C-81590 shall require specific approval by the Government procuring activity. The transparent materials shall be securely anchored within the supports, but where necessary, shall be free to expand and contract with changes in temperature and aging without distorting the structure, to the extent that the efficiency of the joints or the optical qualities of the panel are not impaired. The combination of transparent materials and support frames shall be sufficiently rigid to withstand all design loads imposed in flight, landing, take-off, and under emergency conditions within the scope of the survival mission, without either elastic deflections or permanent deformation of magnitudes which will adversely affect the proper functioning of the closure assembly or its components. Consideration shall be given to the interaction between transparent components and frame caused by thermal effects under extreme temperature conditions to insure that stress concentration in the transparent components is kept to a minimum. Accessories or equipment shall not be attached to the transparent element of the cockpit closure.

3.3.1.1.3.1 Cockpit access through the cockpit closure. Opening of the cockpit closure shall permit ready crew entrance and exit. The cockpit closure design shall comply with the requirements of MIL-C-81590 and shall be such as to eliminate the possibility of its inadvertent opening or loss throughout the flight envelope of the aircraft and during emergency escape and survival conditions.

3.3.1.1.3.2 Cockpit closure controls. The cockpit closure shall be made to open, close, lock and unlock from inside or outside utilizing mechanical, electrical or hydraulic means or any combination thereof.

3.3.1.1.4 Cockpit integrity. The cockpit capsule shall be both airtight and watertight when the aircraft is at rest, in flight, under emergency conditions, or when submerged to depths of 150 feet. The cockpit capsule shall be capable of withstanding loads, without loss of watertight integrity, (including applicable factors of safety) which result from all flight profiles and include emergency escape and survival conditions.

3.3.1.1.5 Cockpit capsule crashworthiness. The cockpit capsule and its furnishings shall be capable of withstanding, without deforming in a manner injurious to crewmen or in a manner which will severely impair manual egress, crash loads as shown in Figure 1. In addition, imposition of the loads shall not cause inadvertent actuation of the propulsion subsystem or ballistic components.

3.3.1.2 Environmental subsystem.

3.3.1.2.1 Normal environmental subsystem. The normal environmental subsystem for the cockpit capsule system shall conform to the requirements of MIL-E-18927 for capsule atmosphere control, acoustic and thermal insulation, defogging and defrosting. Cabin air must conform to the requirements of 3.2.1(g).

3.3.1.2.2 Emergency environmental subsystem.

3.3.1.2.2.1 Cockpit capsule atmosphere. The cockpit capsule atmosphere system after separation and emergency escape shall provide (without the use of an oxygen mask) an atmosphere of at least 5.0 psia which has an oxygen partial pressure of 2.3 to 3.1 psia. The cockpit capsule emergency atmosphere supply shall be of sufficient quantity to provide the required partial pressure of oxygen for the duration of time necessary for capsule separation and descent from an aircraft maximum altitude to an altitude of 15,000 feet. This requirement shall also apply when cockpit capsule decompression has occurred and resulted in capsule pressure being reduced below 5 psia.

3.3.1.2.2.2 Cockpit capsule emergency pressurization. The cockpit capsule shall afford protection to the aircrew in the event of primary pressurization failure when emergency escape from the aircraft is not mandatory. In addition, the emergency pressurization system shall incorporate a capacity to maintain a survival pressure level in the event of combat damage. The capability requirement of the system shall be determined as a result of studies to establish extent and probability of damage based on the combat mission profile of the aircraft, The cockpit capsule shall be capable of being pressurized to a survivable pressure level by means of a system which is separate and independent of the pressurization control for the normal environmental subsystem. The emergency pressurization system shall be capable of completely changing the cockpit volume atmosphere a minimum of three times.

3.3.1.2.2.3 Cockpit capsule emergency ventilation (below 15,000 feet). A mechanism shall be incorporated which automatically actuates the ventilation device (snorkel) at 15,000 feet altitude to provide ambient air. A manual override control shall also be provided.

3.3.1.2.2.3.1 Snorkel. A snorkel ventilation system shall be provided in the capsule for use during land or water survival. The system shall adequately vent the capsule without permitting the entrance of water in high sea tate conditions.

3.3.1.2.2.4 Individual emergency oxygen subsystem. Individual emergency oxygen subsystems, consisting of the standard Navy oxygen mask, miniature breathing regulator, oxygen pressure regulator, oxygen hoses, and a high pressure gaseous oxygen supply, shall be provided for each individual crewman. The emergency oxygen subsystem shall provide a minimum of 100 cubic inches of oxygen for each crew-man. The mask shall be stored in an area readily accessible to the crewmember.

3.3.1.3 Crew seat(s). The aircrew seat(s) shall be designed in accordance with accepted aircraft design practices. Particular attention shall be given towards (a) optimizing aircrew comfort and restraint, (b) optimizing the weight-strength relationship of the seat(s) and supporting structure, and (c) ensuring simplicity of design, high reliability, and the accessibility and maintainability of components.

The seat system shall provide restraint and support for the head, torso, arms, and legs, commensurate with aircraft launching, normal flight involving high accelerations, uncontrolled flight, and crash and impact. with land or water subsequent to escape, rocket firing, rocket burnout, and parachute deployment. Each fully-equipped seat, including seat-capsule attachment, seat adjustment actuator and personnel restraint subsystem, shall weigh less than 50 pounds.

3.3.1.3.1 Seat adjustment. A total of 5.0 inches of vertical seat adjustment (ranging 2.3 inches above and 2.7 inches below the seat neutral reference point) shall be provided. Such adjustment shall be so designed as to permit 3rd - through 98th percentile (eye height, sitting) crewmen to adjust their eye level to the design eye position level. Fore and aft adjustment of the seat within the cockpit shall be provided, as necessary, to ensure efficient aircrewman performance of flight operations. Tilt adjustment of the seat shall be provided, as necessary, to optimize aircrewman comfort and efficiency. Whenever the nominal flight mission duration exceeds 4 hours, the seat shall have the foil owing independent adjustment ranges:

(a) Seat back from 8 degrees aft of vertical to 21 degrees aft of vertical, and

(b) Seat pan from 5 degrees above aircraft waterline to 15 degrees above aircraft waterline.

3.3.1.3.1.1 Seat adjustment control(s). Three-position switch(es) (momentary -ON, center -OFF type) shall be used. The seat adjustment control (s) shall be located so as to preclude injury to the occupant as the seat position is adjusted. In the event more than one seat adjustment control is used, their design and placement shall be chosen to enhance the tactile distinction and selection of the desired control with gloved hand. In addition, the design and location of the seat adjustment control(s) shall not interfere with manual egress of any aircrew members.

3.3.1.3.1.2 Seat adjustment actuator. Electro-mechanical actuators shall conform to the requirements of MIL-A-8064 except that lubrication procedures shall conform also to the requirements of this specification and the salt spray tests shall be conducted in accordance with Procedure II of MIL-E-5272.

3.3.1.3.1.3 Pre-escape adjustment. No manual seat adjustment shall be required prior to initiation of the escape sequence.

3.3.1.3.1.4 Seat back repositioning for ejection. When tilt adjustment of the seat back is provided, the seat back and headrest must be moved and locked automaticaHy in the farthest back position (21 degrees aft of vertical) during the pre-ejection sequence. This repositioning shall be accomplished concurrently within the time period of upper torso restraint retraction, and the backward velocity of the torso shall not exceed 12 feet per second under normal conditions.

3.3.1.3.2 Torso, head and limb support and restraint

3.3.1.3.2.1 Torso restraint. The torso restraint system shall be designed to integrate fully into the 'shirt-sleeve' environment. The design goal envisions the development of a frontal torso assembly which will distribute loads over a large area of the torso and will provide optimum support and comfort for the aircrew. The frontal torso assembly shall be an integral part of the seat system, thus eliminating the necessity of providing personal harnesses for the seat occupants. The garment and the attachment to the seats are to be made of materials which provide minimum elongation under load and which lend themselves into integration with the mechanical take-up systems. Entrance into the seat and subsequent attachment of the frontal torso assembly shall involve a minimum number of closure or attachment functions. A powered system shall be provided which will allow the seat occupant to adjust the tightness of the f rental torso assembly by the actuation of a suitable control located on the left armrest. The control shall be such that when the original desired tightness is achieved in the frontal torso assembly, it will retain this input and cause the system to return to this position during high acceleration maneuvers and upon actuation of the escape system. At all other times the occupant shall be capable of tightening and loosening the f rental torso assembly by manual actuation of the control. A study shall be conducted to determine the optimum number and location of points of connection of the frontal torso assembly to the seat. A control which is tied into the closure jettison system shall also actuate a device for simultaneous severance of all points of connection of the frontal torso assembly to the seat. The frontal torso system; shall not compromise aircrew comfort, efficiency, or effectiveness, and shall be capable of withstanding all the load requirements of aircraft launching, normal flight, flight involving high accelerations (including negative g), uncontrolled flight, crash and impact with land or water subsequent to escape. The frontal torso system shall provide for the complete range of aircrew sizes from 3 through 98 percentile aircrewman. The torso restraint system shall provide negative g restraint and shall provide adequate restraint for preventing submarining of the lower torso during ejection. Powered lower torso restraint mechanisms may be used to ensure adequacy of lower torso restraint during an escape sequence.

3.3.1.3.2.1.1 Shoulder restraint take-up mechanism. The seat shall incorporate an inertia-locking shoulder harness take-up device having a powered retraction feature to automatically place the seat occupant in the best position for withstanding the loads imposed upon him by operation of the escape system. The device shall conform to MIL-D-81514. Full, powered retraction of all crewmen shall occur prior to the severance separation of the cockpit capsule system from the aircraft to provide them maximum protection. The shoulder harness bearing point on the seat shall be located so that the angle between the crewman's midaxillary line and the line the shoulder harness makes to the shoulder harness bearing surface on the crewman's shoulder shall be a minimum of 90 degrees. Forces imposed by the automatic take-up mechanism shall not injure the seat occupant. In addition, the shoulder restraint system must provide adequate lateral restraint of the seat occupant.

A manual lock-unlock control for the take-up mechanism shall be provided on the left side of the seat. The design and placement of the control shall facilitate crewman operation of the control.

3.3.1.3.2.2 Head support and restraint.

3.3.1.3.2.2.1 Head rest. The seat head rest shall be located and configured so as to provide optimum head support and comfort for the following conditions: aircraft launching, normal flight, flight involving high accelerations, uncontrolled flight, crash and impact with land or water subsequent to escape. The head rest dimensions and configuration shall provide head support for 3 through 98 percentile aircrewman sitting height. The head rests shall be so located and configured so as not to interfere with normal flight operation and be consistent with the "shirt-sleeve" environment concept.

3.3.1.3.2.2.2 Lateral head support. The head rest shall incorporate lateral support elements which are ret ratted for normal flight not involving high lateral accelerations. During flights involving high lateral ace elevations or actuation of the capsule escape system, proper head support shall be provided automatically by lateral head support elements. The lateral support elements shall be canted outboard on extension so that guidance and centering of the head is achieved during forward displacement of the lateral support elements. Manually operated lateral support elements may be substituted in lieu of the automatic system for aircraft involving flight profiles where lateral head support is not frequently required and it can be demonstrated that such manual operation does not detract from optimum aircrew efficiency.

3.3.1.3.2.2.3 Head rest adjustments. Consideration shall be given for attachment of the head rest to the seat system so that it moves with the seat during seat adjustment. The head rest shall incorporate a vertical manual adjustment of five inches in no greater than one inch increments to accommodate the complete range of aircrew sizes. In the supported position the back of the occupants head shall be two inches forward of the plane of the occupants back in the mean adjustment position. The head rest shall incorporate a fore and aft manual adjustment of one. and one-half inches from the mean position; adjustments shall be in increments no greater than one-half inch.

3.3.1.3.2.2.4 Shock impact material. The head and lateral support elements shall utilize facing material that will reduce shock impact to a level which is within established human tolerances.

3.3.1.3.2.2.5 Head restraint. The head shall not he restrained bv hooks or direct mechanical attachments which require connecting or disconnecting. Nor shall the head restraint degrade aircrew comfort or performance.

3.3.1.3.2.2.6 Sharp corners. The head rest shall be free of sharp corners or protuberances which could cause injury as a result of contact with the occupant.

3.3.1.3.2.3 Limb support and restraint.

3.3.1.3.2.3.1 Arm rests. The seat shall be provided with contoured trough armrests which include guards on the outboard sides to prevent outward displacement of arms during the imposition of lateral accelerations. The inside of the guard and the trough shall be faced with material which will reduce impact shock to a level which is within established human tolerances.

3.3.1.3.2.3.2 Armrest adjustments. Provision shall be made for a three and one-half inch vertical adjustment in increments no greater than 1/2 inch to provide comfortable arm position for the aircrew.

3.3.1.3.2.3.3 Arm restraint. The arms shall not be restrained by hooks or direct mechanical attachments which require connecting or disconnecting. Nor shall any restraint degrade aircrew comfort or performance.

3.3.1.3.2.3.4 Hand grips. The grips shall be integrated into the hand position of both armrests in such a manner that forward arm displacement under high acceleration loads will be prevented. The configuration and location of the grips shall accommodate 3 through 98 percentile aircrewmen in both the restrained and the unrestrained positions.

3.3.1.3.2.3.5 Lateral leg support. Lateral leg support shall be provided by the sides of the crew seat(s).

3.3.1.3.2.4 Personnel restraint emergency manual release. A personnel restraint emergency manual release shall be provided on the starboard side of the seat. The harness release shall:

(a) Be capable of releasing the crewman from the seat upon actuation when the aircraft is in a crash, ditching or static emergency condition requiring emergency manual egress.

(b) Be capable of being reached and actuated by a crewman in the fully retracted position and in any position of seat adjustment.

(c) Be capable of safetying the escape system ballistic and propulsion components to preclude inadvertent actuation of the propulsion system and/or pre-escape functions which could injure or hinder a crewman attempting escape from a crashed or ditched aircraft.

(d) Require the sequential application of two motions and the application of maximum of forty (40) pounds pull force to actuate.

(e) Lock, when actuated, unless the handle pulls free of the seat when actuated, in the personnel restraint release position, at the same point that harness release occurs. The manual release handle may continue to travel past the lock point in the direction of actuation, but may not return through the lock point.

(f) Be capable of being recycled (by the sequential application of two motions) so that the restraint system can be reset readily by maintenance personnel.

(g) Be capable, immediately after locking, of supporting a 98th percentile, fully-equipped aircrewman using the manual release as a handhold or support while manually egressing from the cockpit.

(h) Have a cycle service life of at least 50,000 cycles. A cycle shall consist. of the movement of the control from one position to the other and back to the initial position.

The handle of the manual release for the restraint harness shall be of such size that a 98th percentile gloved hand may be readily inserted. If a squeeze-and-pull type, two motion handle is utilized, that portion of the handle, about which the seat occupant must wrap his fingers to squeeze, shall have a cross section s efficiently large to reduce interference with the squeezing action caused by contact between fingers and the palm or heel of the hand. If push-pull control is utilized for the emergency manual release it shall be in accordance with MIL-C-7958.

3.3.1.3.2.5 In-flight release and connection of personnel restraints. In multi-crew aircraft, in which crewmen may be required to leave their crew stations during flight; the personnel restraints shall be capable of being easily and rapidly released and connected by the crewman without assistance.

3.3.1.3.3 Loads.

3.3.1.3.3.1 Normal aircraft loads.

3.3.1.3.3.1.1 Flight loads. The capsule shall withstand the loads imposed by the aircraft during normal flight while it is an integral part of the. aircraft. The loads shall be derived in accordance with MIL-A-8860, MIL-A-8861, and MIL-A-8865.

3.3.1.3.3.1.2 Landing, launch, and ground handling loads. The capsule shall withstand the loads imposed during landing, launch, and ground handling while an integral part of the aircraft. These loads shall be derived in accordance with MIL-A-8862 and MIL-A-8863.

3.3.1.3.3.1.3 Fatigue loads. The capsule shall withstand the expected repeated load environment history resulting from flight operations including maneuvers, buffeting, gust, pressurization, and sonic fatigue loads; from ground operations, taxiing, landing, catapulting, and arresting; and from repeated operation of devices. These loads shall be derived in accordance with MIL-A-8866.

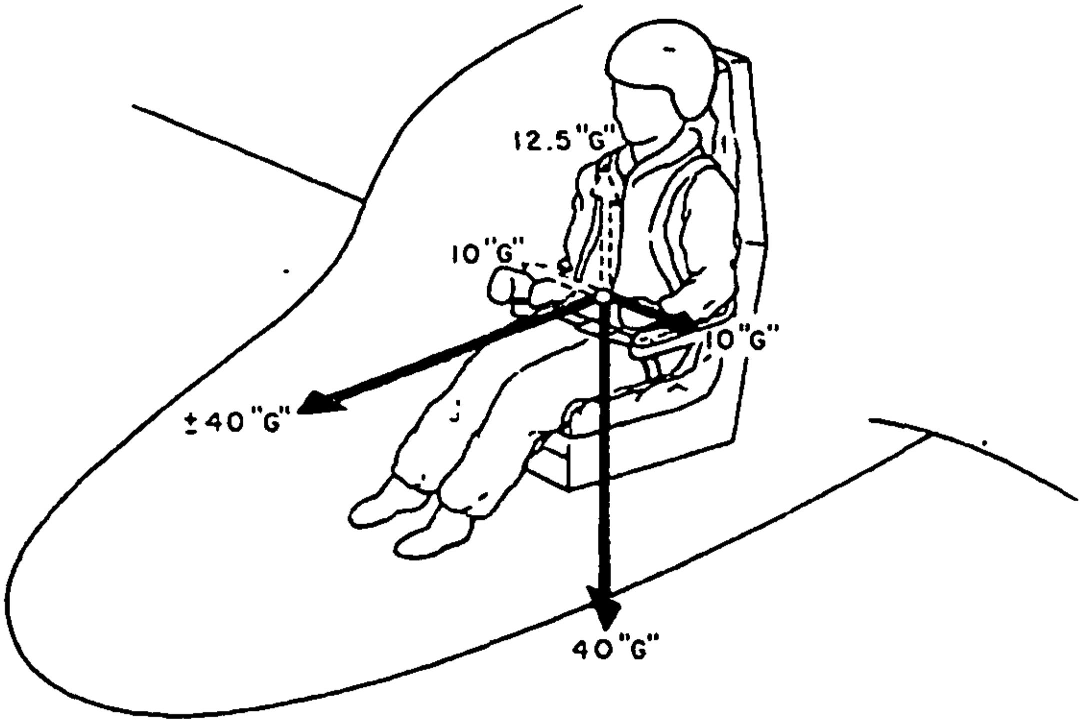
3.3.1.3.3.1.4 Internal pressures. The internal pressures are to be used with the flight loads of 3.3.1.3.3.1.1. The pressure differential between pressurized portions of the structure and ambient pressure shall be zero and 1.0 times the maximum attainable combined with the flight loads. Also, pressure loads of 1.33 times the maximum attainable combined with 1.0g flight loads shall be withstood.

3.3.1.3.3.2 Crash loads. With 95 percentile (weight) aircrewmen restrained in the seat(s), the seat(s) system and attachment structure shall be capable of supporting, without failure, the ultimate loads resulting from aircraft crash accelerations of 40G's forward, 40G's aft, 40G's vertical (up), 10G's lateral and 12. 5G's vertical (down). See Figure I.

3.3.1.3.3.3 Loads during escape sequence. All parts of the seat, the seat attachment fittings, and the seat supporting structure shall be capable of withstanding without failure, loads resulting from aircraft uncontrolled flight, capsule separation, capsule boost, stabilization, and subsequent parachute system deployment.

3.3.1.3.3.4 Load limiters. The seat system shall incorporate an energy attenuating system which will reduce the seat-man (down) impact acceleration to within the safe physiological limit of 20G's. Various energy attenuating materials and systems can be considered such as the metal bending techniques, elongation of fully annealed stainless steel cable, sheet or rod materials or the incorporating of 2 dampening system within the envelope of the electro-mechanical seat adjustment actuator (see NAEC-ACED Report No. 335 for typical stainless steel installation). The crash vectors shall be assumed as acting at the C.G. of the seat-man combination,

3.3.1.3.4 Anti "G" protection. Aircrew Anti "G" protection shall be provided if the aircraft mission profile dictates the installation of such a system. Anti "G" protection can be provided by seat supination, pressure application to the aircrewman or any combination the reef. The Anti "G" system shall be fully automatic with an override control provided for the aircrew for manual operation.



CRASH LOADS

CRASHLOADS ACTING AT THE CG OF THE SEAT-MAN COMBINATION

IMPACT ACCELERATION - TIME EXPOSURE

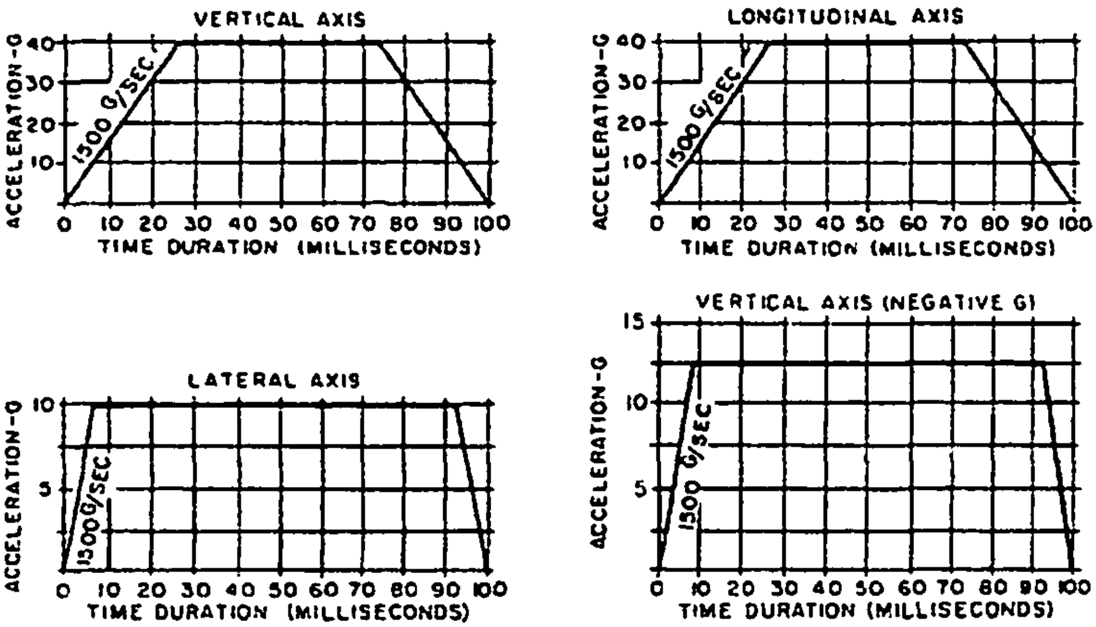


FIGURE 1

3.3.1.4 Escape system initiation and sequencing subsystem.

3.3.1.4.1 Escape initiation controls.

3.3.1.4.1.1 Inflight. Control grips, either of which will initiate the escape function shall be located off the seats in the vicinity of both the right and left armrests of both seats of a two-place aircraft and of the seats for pilot and co-pilot (or other crewmember designated by the Government procuring activity) in aircraft with larger crews. Minimum hand movement shall be required after release of aircraft flight controls. The control grip locations and size shall be selected to facilitate their being grasped and actuated by the seat occupant while restrained in the full back position and/or while being subjected to buffeting. To prevent inadvertent operation, initiation of these controls shall require a two-motion actuation. If a squeeze-and-pull type, two-motion handle is utilized, that portion of the handle, about which the seat occupant must wrap his fingers to squeeze, shall have a cross section sufficiently large to reduce interference with the squeezing action caused by contact between fingers and the palm or heel of the hand. A visual indicator shall be provided to indicate the safe and armed status of the escape control. A ground safety lock with status indicator shall be provided for protection during ground operations.

3.3.1.4.1.2 Underwater. A suitable sensing element(s) shall be located on the cockpit capsule and/or aircraft to initiate the underwater escape sequence automatically at a water depth of 15 +5 feet. The sensing element(s) design, location and integration with the underwater escape initiation subsystem shall preclude inadvertent operation either resulting from personnel actions or from exposure to fog, spray, condensate, rain, hosing, and/or other inflight, ground or shipboard environmental conditions.

3.3.1.4.1.2.1 Underwater (Manual backup). For underwater escape conditions, a suitable escape initiation manual backup control shall be provided and located in such a manner as to be operable by either hand. The control shall incorporate a two-motion actuation to prevent inadvertent operation. Operation of the control shall initiate the normal underwater escape sequence. A visual indicator shall be provided to indicate the safe/armed status of the escape initiating control. A ground safety lock with stat us indicator shall be provided for protection during ground operations.

3.3.1.4.1.3 Location of escape system firing controls. The configuration and location of the escape system initiation controls shall permit firing control actuation by aircrewmen both while restrained and while unrestrained in the seat. The controls shall be accessible to the 3rd through 98th percentile crewmember. The escape initiation control system shall be designed to prevent inadvertent actuation during the imposition of high acceleration due to landings, takeoff, crash, and high maneuvering accelerations. A positive forward or sideward thrust on the escape initiation controls s hail not actuate the system.

3.3.1.4.1.4 Command selection controls and systems. A command selection control shall be furnished, permitting the pilot and one other crewmember to initiate all escape system sequences. This system shall not negate the capability of the pilot to initiate the escape sequence for the entire crew. Placement of the command selection control in any position other than pilot command shall be noted by an advisory visual signal conforming to the requirements of MIL-STD-411 in the pilot's station. If the advisory visual signal is a light, provision shall be made for the pilot to override and reset the signal.

3.3.1.4.1.5 Escape warning signal. In multi-crew aircraft in which crewmen may leave their seats during flight, a bailout signal conforming to MIL-STD-411 shall be provided to enable pilot and/or copilot to alert such crewmen to return to seats.

3.3.1.4.2 Initiation and sequencing subsystem.

3.3.1.4.2.1 Initiation subsystems. An escape system initiation and sequence subsystem shall be provided to be initiated by actuation of an escape system firing control. One complete actuation of an escape system initiation control shall cause initiation of all pre-escape and escape sequences.

3.3.1.4.2.2 Subsystem/component sequencing.

3.3.1.4.2.2.1 Inflight. The actuation of the inflight escape initiation control shall cause the accomplishment of the following (not necessarily in the indicated sequence) and such other events as are required for safe inflight and groundlevel escape and recovery:

(a) Actuation of aircrew restraint subsystem

(b) Actuation of stabilization device(s)

(c) Initiation of separation subsystem

(d) Initiation of capsule boost

(e) Initiation of emergency signaling device

(f) Initiation of recovery subsystem

(g) Initiation of landing impact attenuation subsystem

(h) Actuation of flotation subsystem

(i) Actuation of classified equipments destruct subsystem

3.3.1.4.2.2.2 Underwater. The actuation of the underwater escape initiation subsystem either automatically or by the manual backup control shall cause the accomplishment of the following (not necessarily in the following sequence) and such other events as are required for safe underwater escape and surfacing:

(a) Actuation of aircrew restraint subsystem

(b) Actuate capsule separation subsystem without actuation of capsule inflight escape boost. subsystem

(c) Initiate emergency signaling device

(d) Actuate flotation subsystem

(e) Actuation of classified equipments destruct subsystem

The capsule inflight escape boost subsystem, capsule inflight stabilization subsystem and the capsule inflight recovery subsystem shall not be actuated during underwater escape.

3.3.1.4.2.2.2.1 Inverted underwater escape. The order of events required for safe underwater escape must be sequenced to occur in a manner compatible with the separation and clearance of the intact cockpit capsule from upright and adverse attitude submerged, sinking aircraft and its subsequent ascent to the surface to float in an upright condition.

3.3.1.4.2.3 Escape initiation and sequencing subsystem redundancy. Actuation, as described herein, of one escape system firing control shall activate completely redundant, independent initiation signal transmission lines. Initiation signal transmission between successive escape system operation devices also shall be accomplished by independent, redundant m cans. Routing of these independent, redundant initiation signal transmission lines should be chosen to minimize the likelihood that localized aircraft damage would prevent safe operation of the escape system.

3.3.1.5 Cockpit capsule severance/separation subsystem. The separation subsystem shall be capable of separating the intact cockpit capsule from the basic aircraft structure both in air or under water. Air separation shall not introduce to the capsule upsetting forces which would adversely affect satisfactory escape and/or capsule attitude during booster thrust. Both in air and under water, actuation of the separation system shall not introduce forces which are physiologically intolerable. The separation subsystem shall be initiated by the escape initiation and sequencing subsystem and shall initiate all the separation devices (power cartridges, initiators, detonators, linear shape charges or mild detonating (fuze) cord, etc.). The method of separation shall be optimized so that the system utilizes the most efficient and reliable methods of separation. The separation shall be accomplished without injury to personnel or damage to the cockpit capsule caused by fragmentation, blast, or fire. The separation system shall be fully integrated with the parent aircraft and the cockpit capsule inflight and underwater escape sequencing subsystems. The severance/separation system shall be capable of operating throughout the pressure regime of the aircraft, from maximum flight altitude to a water depth of 100 feet following equalization for 5 minutes at the given pressure.

3.3.1.6 Propulsion subsystem. An approved propulsion subsystem shall be used to eject the cockpit capsule with occupant(s) from the aircraft. The rocket motor/rocket catapult propulsion unit (s) installed on the escape system shall conform to Naval Air Systems Command AS1578 and shall be approved by the Government procuring activity prior to installation or use. The propulsion subsystem used to provide safe underwater escape must be capable of operating in water to depths of 100 feet. Information required under AS2556 shall be provided (see 6.3) on all rocket motor/rocket catapult propulsion units. Where feasible, propulsion subsystems previously qualified and released for service use shall be used in preference to developing and qualifying new propulsion subsystems. Information concerning existing qualified propulsion subsystems can be obtained from the Commanding Officer, Naval Ordnance Station, Indian Head, Maryland 20640. Ballistic catapults not an integral part of a rocket catapult shall be designed in accordance with MIL-D-21625 and MIL-D-23615.

3.3.1.6.1 Rocket centerline of thrust/capsule c.g. eccentricity. The contractor shall determine the man-system combination centers of gravity extremes for the full specified range of crewman percentiles with applicable flight clothing and equipments and for the full range of aircrewmen, and must not be adversely affected by seat adjustments. In multi-place aircraft the range of c.g. extremes shall include variations resulting f rum crew station vacancies. The rocket system centerline of thrust shall be located with respect to the extremes of the c.g. of the man-system combination, as approved by the Government procuring activity, so as to prevent excessive forward or aft pitching and/or roll of the cockpit capsule system during rocket burning which could result in fouling of the recovery parachute subsystem and/or excessive loss in system performance. This location shall be optimum throughout the entire aircraft performance spectrum considering the entire percentile range of aircrewmen, and must not be adversely affected by seat adjustments nor by crew station vacancies. Neither the occupants nor ground crew personnel shall be required to effect any adjustment of the escape system or any of its components to ensure achievement of the optimal relationship between man-system combination center of gravity and the rocket thrustline.

3.3.1.6.2 Structural attachment of propulsion subsystem to cockpit capsule. Structural attachment fittings of the propulsion subsystem and respective mating fittings of the aircraft cockpit capsule shall be made from materials which exhibit a high strength dynamic load capability and maximum corrosion resistant properties. The attachment to cockpit capsule structure shall be positive and safetied to prevent disengagement under all environmental conditions of use. Environmental conditions shall include, but arc not limited to, the most critical conditions of catapulting, arrested landings, aircraft and ship vibration characteristics, crash and hard landings, and flight maneuvers.

3.3.1.7 Ballistic components. All ballistic components, including, but not limited to cartridges, cartridge-actuated devices, and ballistic hoses and fittings, shall be approved by the Government procuring activity prior to installation or use in the escape system. All cartridges and cartridge-actuated devices shall conform to the requirements of MIL-D-21625 (or MIL-C-83125) and MIL-D-23615. All cartridges and cartridge-actuated devices which must function to ensure safe underwater escape, shall be capable of operating in water to depths of 100 feet following an immersion time of 5 minutes. Where feasible, active red indancy, in the form of duplicate cartridges or dual initiation systems for each cartridge, shall be provided for each cartridge actuated device. Where feasible, cartridges and cartridge actuated devices previously qualified and released for service use shall be used in preference to developing and qualifying new cartridges and/or cartridge actuated devices. Qualified (per MIL-D-21625, MIL-C-83125 and/or MIL-D-23615) cartridges and cartridge actuated devices are described in NAVAIR Report No. 7836 and NAVAIR 11-100-1. Additional design information concerning listed items and concerning additional cartridges and cartridge actuated devices may be obtained from the Commander, Naval Weapons Laboratory, Dahlgren, Virginia 22448. Government procuring activity permission must be obtained for the development and qualification of new cartridges and/or new cartridge actuated devices. Application for such permission shall be made in writing and shall include a functional description of the device involved, the power and gas volume requirements of the application and a list of existing ballistic components considered and the reasons for their rejection.

3.3.1.7.1 Protection of ballistic components from heat and fire. Escape system ballistic components located outside the cockpit and those located immediately adjacent to, or in contact with, areas which by their design nature are susceptible to heating sufficiently to degrade or cook off such components, shall be insulated to retard the rise of temperature when the components are exposed to fire. Care should be exercised to avoid routing or placing ballistic components in close proximity to locations that often are sufficiently hot to damage these components. In addition, voids containing escape system ballistic components shall contain nontoxic fire suppressants which can be released manually from within the cockpit to reduce the likelihood of fires in those voids following crashes.

3.3.1.7.2 Ballistic hoses and fittings. Ballistic hoses and fittings, and subsystems utilizing ballitic hoses and fittings, shall be selected and/or designed to ensure reliable, repeatable transmission, without loss of subsystem/component integrity, sufficient pressure and/or temperature from the gas source to the output device to ensure the reliable actuation of the output device. To the maximum extent practicable, ballistic hose and fitting systems shall be located and routed and/or shielded to (a) protect aircrewmen, equipments and escape system components from injury/damage resulting from ballistic hose and/or fitting failure during operation, and (b) to protect the ballistic hoses and fittings from mechanical damage during normal seat operation, ejection, or removal, stowage or installation of the seat. Ballistic hose bends (elbows) in excess of 45 degrees should be held to a minimum,

3.3.1.7.3 Ballistic signal transmission lines. Ballistic signal transmission lines (contained detonating cord, mild detonating fuse, ballistic hose and fitting subsystems, etc.) shall be selected, designed, routed, and mounted to enable such subsystems to withstand loads imposed by flight vibrations and by seat adjustment without failure and without degradation sufficient to cause loss of subsystem/ . component integrity during operation. In addition, signal transmission line routing and mounting shall be selected to provide maximum protection against handline damage or damage caused by crewmember movement.

3.3.1.7.4 Electric initiators. Electric initiators shall comply with the requirements of MIL-I-23659.

3.3.1.7.5 Precautions for electrical ignition systems. Electrical ignition systems shall be protected from hazards of electromagnetic radiation in accordance with MIL-P-24014 and shall be independently shielded circuits secured against vibration and protected against short circuits or grounds resulting from chafing. The system shall be protected from spray, dampness and excessive heat. Junctions shall be individual shielded connectors designed to eliminate current leakage from other aircraft circuits and to minimize hazards of electromagnetic radiation from aircraft or nearby radar and other electrical components aboard ship, station or aircraft. The ignition system electrical power supply shall be used solely to supply power to the ignition system and shall be adequate to ensure ignition under all service environmental conditions herein specified. In addition, throughout a two PAR (Progressive Aircraft Rework) installation period, the ignition system electrical power supply shall be capable of supplying upon demand adequate power without recharging or maintenance.

3.3.1.8 Retardation and stabilization subsystem. A retardation and stabilization subsystem, consisting of any mechanical, ballistic, or aerodynamic device, as approved by the Government procuring activity, shall be provided for the escape system to give a stabilized trajectory of the system during escape. The retardation and stabilization subsystem shall be deployed automatically during the pre-escape sequences to provide capsule stability as the escape system clears the aircraft. The retardation and stabilization subsystem shall be capable within its design parameters of withstanding and functioning when subjected to maximum dynamic pressure of the aircraft flight envelope. The retardation and stabilization subsystem shall dampen any eccentric loads imposed on the escape system. During aerodynamic deceleration, oscillation of the cockpit capsule shall not exceed 20 degrees in the pitch and yaw planes. The retardation and stabilization subsystem shall maintain the rates of roll, pitch, and yaw of the escape system within known physiological tolerance levels until altitude and/or time for deployment of the recovery subsystem is reached. Deployment of the retardation and stabilization subsystem shall not impose deceleration forces which will cause injury to the cockpit capsule occupants, The subsystem shall be completely integrated with the parent aircraft and the overall emergency escape and recovery system and shall exhibit structural integrity, and ease of maintenance.

3.3.1.8.1 Retardation and stabilization subsystem purpose. The retardation and stabilization subsystem is required to obtain velocity and stability characteristics which are required for the following:

(a) Control of the application of "G" forces to the cockpit capsule occupants so that these "G" forces, resulting from separation, capsule boost, drag, or other sources, shall be within established physiological limits.

(b) Cause cockpit capsule deceleration to be maintained at a high constant rate consistent both with the physiological tolerance of its occupant(s) and with the rapid speed reduction to permit safe deployment of the recovery system.

3.3.1.8.2 Mechanical, ballistic or aerodynamic retardation and stabilization. A ballistic system, aerodynamic vanes, drag surfaces, or parachute system, or any combination thereof, may be utilized to provide the requisite retardation and stabilization. The choice of systems/device(s) shall be dependent on the performance characteristics of the parent aircraft and the deceleration/stabilization requirements for accomplishment of the escape survival and recovery mission.

3.3.1.8.2.1 Parachute stabilization. The stabilization parachute(s) utilized, shall provide stabilization force or guidance augmentation adequate to maintain the composite forces imposed upon the cockpit capsule occupant(s) within human tolerance limits and to provide cockpit capsule orientation to promote orderly and reliable final recovery parachute deployment. In addition, the parachute(s) shall maintain a constant, high, physiologically-safe rate of cockpit capsule deceleration until the airspeed of the cockpit capsule reaches a speed at which recovery system deployment can be effected safely.

3.3.1.8.2.1.1 Positive forced deployment of each of the parachute(s) to full line stretch shall be provided. The deployment of parachute(s) shall be automatically programmed into the escape sequence. Provision shall be made against inadvertent actuation of the parachute(s); crosswind or upstream deployment of the parachute(s) shall be avoided.

3.3.1.8.2.2 Non-parachute stabilization. Non-parachute means of stabilization (i.e.: mechanical, aerodynamic vanes or drag surfaces, ballistic), if utilized, shall perform the same functions as, or shall complement the functions of, the stabilization parachute and shall be integrated completely with both the parent aircraft and the cockpit capsule. The device(s) shall be automatically programmed into the escape sequence. Provisions shall be made to preclude inadvertent actuation of the device(s). Rocket motors shall comply with all AS1578 requirements.

3.3.1.9 Recovery subsystem. A recovery subsystem consisting of any mechanical, ballistic and/or aerodynamic device(s), as approved by the Government procuring agency, shall be provided to ensure that the cockpit capsule (heaviest configuration) total velocity or its vertical descent rate at impact under ICAO standard conditions do not exceed safe landing velocities considering crew restraint and positioning and capsule energy attenuation subsystem capabilities. Deployment and actuation of the recovery subsystem shall be initiated automatically in proper order by the escape system sequencing and/or control subsystems, The recovery subsystem shall be integrated completely into both the parent aircraft and the cockpit capsule.

3.3.1.9.1 Parachute recovery subsystem. A single-stage, multi-stage or multiple-canopy parachute subsystem may be utilized. Initiation of the recovery parachute(s) deployment shall be dependent upon the escape system time-sensing, altitude-sensing and, if required, force-sensing devices and control subsystems. The parachute(s) may be deployed aerodynamically or forcibly and spread aerodynamically or forcibly to ensure rapid, consistent and physiologically safe operation. Aerodynamic deployment shall be accomplished by m cans ensuring rapid and unobstructed passage of the parachute(s) into the non-turbulent airstream. If the parachute(s) is forcibly deployed, the cockpit capsule shall be oriented and stabilized to ensure the downstream deployment of the parachute recovery subsystem and/or the deployment subsystem shall be designed to ensure the downstream deployment of the parachute(s). Crosswind or upstream deployment of the parachute(s) is unacceptable.

3.3.1.9.1.1 Independent operation. All stages of the recovery system shall be independent of one another. Interconnection is permissibe if it can be accomplished without adversely affecting independent operation. The failure of any parachute component to deploy, open, or release shall not preclude positive operation of the final recovery parachute.

3.3.1.9.1.1.1 Staging. Intermediate stage or stages (prior to recovery parachute) shall function in manner similar to the first stage decelerator. Each stage may be operable independent y or be operated by the previous stage.

3.3.1.9.1.1.1.1 Reefing. Reefing is an acceptable method of parachute staging.

3.3.1 .9.1.1.2 System sequencing. AH sequencing controls and pyrotechnic components, the failure of which could preclude proper operation of the final recovery parachute, shall be redundant and parallel.

3.3.1.9.1.2 Deployment of main recovery parachute. Upon release of the first stage decelerators or intermediate stage parachutes, a sensing element (speed, time delay, acceleration, dynamic pressure, or any combination thereof) shall initiate deployment of the main recovery parachute. In no case shall the last stage of main recovery parachute be automatically deployed above 15,000 feet.

3.3.1.9.1.2.1 Manual override. A manually controlled override shall be provided to permit manual initiation of the main recovery parachute deployment operation at any altitude. The pilot shall be provided with an altitude sensing instrument which is operable throughout the escape sequence.

3.3.1.9.1.3 Provisions for parachute jettisoning on cockpit capsule impact. All final stage parachutes shall be capable of being positively jettisoned upon land or water impact by manual means by the restrained capsule occupant(s). The handle shall require positive two, or more, motions to actuate.

3.3.1.9.1.4 Underwater operation. In the event of automatic or underwater escape system operation, all parachute recovery system components shall be immediately jettisoned or completely bypassed to preclude parachute deployment. If the parachute recovery system is retained, it shall not have a detrimental effect on the buoyancy or seaworthiness of the cockpit capsule.

3.3.1.9.1.5 Parachute recovery subsystem installation. Packaging, storage and installation of individual parachute system components and deployment and sequencing mechanisms shall be designed to facilitate individual maintenance and replacement of these items. In addition, provisions shall be made for protection of the system from capsule boost systems activation, contaminants, fragmentation, excluding enemy action and fire.

3.3.1.9.1.6 Pressure packing. Pressure packing of parachutes may be employed provided such does not degrade deployment and opening reliability.

3.3.1.10 Cockpit capsule locator subsystems. Means shall be provided for automatically activating escape system locator devices upon separation of the cockpit capsule from the aircraft. Such means shall be readily accessible and readily disconnected in the event the using activity deems undesirable the automatic activation of the devices. Means also shall be provided for the selective manual activation of the individual locator devices. It is desirable that arming/safetying the subsystem be a task readily accomplished inflight and that a visible indication be provided concerning the status of the subsystem.

3.3.1.10.1 Chaff dispersal subsystem. Provision shall be made for dispersal of radar chaff during separation of the cockpit capsule from the aircraft. The dispenser shall use a radar reflector package(s) conforming to MIL-C-81467 and shall be located and designed to permit using activities to connect/disconnect or to load/unload the dispenser while installed in the aircraft.

3.3.1.10.2 Aircraft emergency IFF actuation. The escape system shall incorporate provisions for automatic actuation of the emergency IFF system upon separation of the cockpit capsule from the aircraft. It is desirable that the system be capable of being armed and/or safetied inflight.

3.3.1.10.3 Radio, beacon and communications. The cockpit capsule shall be provided with, UHF voice communications in accordance with MIL-R-22659 and UHF Air Sea Rescue. beacon equipment in accordance with XAV-111, to facilitate location during rescue operations. Power for beacon and communications radios shall be provided by the emergency electrical power system.

3.3.1.10.4 Locator lights. Provisions shall be made for cockpit capsule exterior signal light located to achieve optimum signaling capabilities. The signal light shall be energized automatically after separation has been effected. A manual switch shall be provided. The lighting characteristics shall be equal to or better than the anticollision light specified in MIL-L-006730.

3.3.1.11 Survival subsystems.

3.3.1.11.1 Ground or water impact. The cockpit capsule structure, crew seat system, and necessary equipment needed for survival on land or sea shall be capable of sustaining landing impact loads without sustaining damage likely to cause injury to the occupant(s) and/or to degrade the subsequent survival phase of the escape. Accelerations caused by impact with dry surfaces may be reduced by allowing cockpit capsule structure to crush or by other suitable energy attenuation m cans without impairing emergency abandonment or the utilization of necessary survival systems. However, the capsule structure shall be designed to prevent rupture and leakage upon landing on a water surface.

3.3.1.11.2 Flotation. The cockpit capsule shall be provided with an emergency flotation capability. Particular attention shall be given to the center of buoyancy (i. e. maintaining a positive metacentric height) so that cockpit capsule will always float in an upright position taking into consideration all cockpit capsule impact attitudes. Consideration should be given to the incorporation of a water guidance system so that the cockpit capsule impact attitudes. Consideration should be given to the incorporation of a water guidance system so that the cockpit capsule orientation is optimum in regard to wave action. Flotation attitude shall be such that the normal ingress and egress openings and emergency escape opening(s) are not below the water line. The cockpit capsule shall be capable of floating for a minimum of 72 hours while being subjected to a sea state of at least Beaufort 5 wave action. A bilge pump shall be provided for the removal of water which may enter into the capsule. It shall not be necessary to open the cockpit capsule to pump water overboard. Maximum cockpit capsule leakage shall not exceed 1 gal/hr when all egress panels are closed.

3.3.1.11.3 Shelter. The cockpit capsule shall be capable of being used as a temporary shelter during flotation, arctic, and desert survival. The period of habitation should be assumed to be a minimum of 72 hours.

3.3.1.11.4 Emergency abandonment. The aircrew shall have a control which which actuated will perform the following functions under emergency abandonment conditions involving ground crashes or underwater egress.

(a) Severance of all restraints

(b) Jettison of cockpit closure panels

Provisions shall be made to prevent inadvertent actuation by the introduction of a manual safety.

3.3.1.11.5 Rescue ingress. A control handle shall be integrated into the exterior of the capsule so that it is readily accessible to and operable by rescue personnel, wearing protective gear, during underwater or ground crash rescue operations. This control, when actuated, shall jettison the cockpit closure or egress panels. Instructions for rescue ingress shall be clearly marked on the external surface of the cockpit capsule in close proximity to the handle.

3.3.1.11.6 Cockpit capsule emergency electrical system. The cockpit capsule shall be provided with an emergency electrical system which shall be compatible with the parent aircraft system and capable of providing satisfactory electrical energy for all functions involving escape and survival. Power provided by the emergency electrical system shall be sufficient to power for 4 hours continuously both the radios (3.3.1.10.3) and locator lights (3. 3.1.10.4).

3.3.1.12 Survival equipments.

3.3.1.12.1 Survival equipments for onboard usage. The requirement for or the storage of necessary survival equipment shall be specified in the detailed specification.

3.3.1.12.2 Transportable survival equipments. Stowage provisions shall be made, in 2 location readily accessible to the individual crewman, for fully equipped survival vest(s) conforming to MIL-V-81523, and flotation preserver(s) conforming to MIL-L-81561 for use in the event survival circumstances or enemy evasion dictates abandonment of the cockpit capsule after ground/water impact.

3.3.1.13 Fire suppression subsystem. A manually-activated cockpit interior fire suppression agent shall be incorporated in the cockpit capsule. This subsystem shall be separate from that required under 3.3.1.7.2.

3.3.1.14 Ground safety equipment. Removable ground safety pins shall be provided and shall be a "single-acting type quick release pin" designed in accordance with MIL-P-23460. Safety pins shall be visible and readily accessible. Safety pins shall be securely fastened to a red fabric streamer designed in accordance with NAS 1091. The streamer shall be marked in large white letters:

REMOVE BEFORE FLIGHT". Safety pins shall not lock in place unless the devices in which the pins are inserted are safetied. In addition a system deactivating device shall be provided in the cockpit capsule and on the exterior of the aircraft in reach of or clearly visible to the aircrew (while seated) and the ground crew. When activated. the device will indicate clearly that the escape system or particular component is safetied and not ready for flight. The safety device shall be spring-loaded so as to remain in either the safety-on or safety-off position. When in the safety-off position, the device shall not interfere with the seated aircrewman 's comfort.

3.3.1.14.1 Safety pin and streamer flight stowage. Provisions shall be made for the stowage of the escape system safety pins and streamers to prevent their loss or their interfering with aircraft control, and to ensure their availability to ground crews. The stowage provisions must be located in a position accessible to the seated pilot and shall permit stowage of the safety pins and streamers and securing the stowage device with one hand. In addition, the stowage provisions should be accessible to maintenance personnel or rescue personnel reaching into the cockpit.

3.3.1.15 Classified equipments destruct subsystem. When necessary for safeguarding against compromise of characteristics of classified equipments contained in the aircraft, a classified equipments destruct subsystem shall be provided. The subsystem shall be an explosive or thermal system in general conformance with the requirements of MIL-D-38015, or as otherwise specified by the Government procuring activity, and shall be inn-degraded into the escape system initiation and sequencing subsystem to ensure operation during or immediately following crew escape from the aircraft. Provision also shall be made for manual operation of the destruct subsystem and for the automatic operation of the subsystem during a crash. Manual actuation of the subsystem shall be two separate deliberate actions by one crewmember. All cartridges and cartridge actuated devices employed in the subsystems shall conform to the requirements of MIL-D-21625 and MIL-D-23615, Operation of the destruct. subsystem in proper sequence with the other operations of the escape system shall not produce impulse noise levels greater than permitted under 3.2.1(f), nor shall its operation result in the release into crew spaces toxic or noxious elements and/or gases in concentrations in excess of those permitted under 3.2.1(g).

3.3.2 Escape system performance. Following aircrewman response and upon aircrewman actuation of the escape system the aircrew shall be provided with escape capabilities under the conditions listed in Table I and for all conditions of center of gravity location.

TABLE I

ESCAPE SYSTEM PERFORMANCE REQUIREMENT CAPABILITIES

Terrain Clearance Altitude (feet) 1/	Attitude	Sink Rate (fpm)	Speed (KEAS) 2/
25	Wings and nose level	2400	130
100	Wings and nose level	5000	130
25	30° Bank and nose level	2000	50
100	30° Bank and nose level	5000	130
50	45° Bank and nose level	2000	130
120	45° Bank and nose level	5000	130
150	90° Bank and nose level	2000	130
250	90° Bank and nose level	5000	130
200	120° Bank and nose level	0	130
300	150° Bank and nose level	0	130
400	180° Bank and nose level	0	130
25	Wings level and 5° nose down	1200	130
30	Wings level and 10° nose down	2000	130
50	Wings level and 15° nose down	3000	130
130	Wings level and 20° nose down	4500	130
0	Wings and nose level	0	0
0	Wings level and nose 20° down	0	50
0	Wings and nose level	0	350
100	Wings and nose level	0	650
150	Wings and nose level	0	V_L
900	Wings level and nose 30° down	3/	450

1/ Maximum acceptable altitude for initiation of safe escape. At no point in the trajectory shall the escape capsule contact the ground until having achieved a descent rate which, considering crew restraint and positioning and capsule impact energy attenuation subsystem capabilities, will result in safe landing impact loads for the crewmen.

2/ All airspeeds measured along the aircraft flight path.

3/ The aircraft descent rate attained for the specified attitude and airspeed.

3.3.2.1 Escape system performance objectives. The escape system should be designed (a) to provide the minimum trajectory height necessary to ensure a minimum clearance of 5 feet from parent aircraft structure and consistent with the sink rate and airspeed escape capabilities specified herein, and (b) to provide the minimum safe parachute deployment and spreading times following separation of the capsule from the aircraft.

3.3.3 Access ports. Access ports, which can be readily uncovered shall be incorporated in the cockpit capsule and in the aircraft to permit inspection of any other critical mechanism or component which is otherwise not readily accessible for inspection and which requires periodic inspection. The access ports shall be of such size and shape to permit necessary adjustments and minor maintenance to be performed without requiring removal of the seat(s) from the aircraft. AH access port edges, which a maintenance man's arms and/or hands might contact during the performance of necessary tasks through the access ports, must be rounded or covered so as to protect the maintenance man. Quick opening inspection ports, locked shut with approved quick release fasteners, shall be provided to enable aircrewmen to perform preflight inspection of the system. Preflight inspection ports also shall be incorporated where necessary to permit aircrewmen to ascertain that safety pins are installed/removed (as required) and that any critical component capable of being visually inspected for flight condition, is ready for flight.

3.3.4 Ball-lock type devices. All devices utilizing ball-lock pin type quick release features shall meet the strength requirements listed in MIL-P-23460.

3.3.4.1 Ball-lock type features. To aid in precluding their inadvertent removal prior to flight, ball-lock type devices used as quick release quick installation fasteners shall be sized and configured differently from ball-lock pins used as safety pins.

3.3.5 Precautions against component misinstallation. Cartridges, cartridge-actuated devices and other replaceable components shall be designed to preclude misinstallation which could adversely affect the functioning of the cockpit capsule or its subsystems.

3.3.6 Inadvertent actuation. The system shall be designed to prevent inadvertent actuation.

3.3.7 Weight. The weight of the cockpit capsule system shall be kept at a minimum consistent with the escape system requirements and perforw.ante contained in this specification.

3.3.8 Capsule color.

3.3.8.1 Interior cockpit color. The interior cockpit color shall be in accordance with MIL-C-8779.

3.3.8.2 Exterior capsule color. The exterior color of the capsule shall conform to the color scheme for the parent aircraft in accordance with MIL-C-18263.

3.3.9 Marking and decals. Labelling shall be in accordance with MIL-STD-1472 and the following requirements.

3.3.9.1 Marking of controls. All escape system controls shall be suitably identified and marked with approved nomenclature in accordance with MIL-M-18012 and shall be marked to indicate the direction of movement for proper operation,

3.3.9.2 Operating instructions and warning. Decalcomanias outlining operating instructions and warnings shall be placed at appropriate locations on the seat. Decalcomanias in accordance with MIL-A-25165 shall be placed in appropriate locations on the outside of both sides of the aircraft approximately 4 inches below the cockpit rail and on the seat(s) headrest(s). Rescue arrows shall be incorporated on the outside of the aircraft structure in accordance with MIL-I-18464. Warning decalcomanias also shall be placed above each device, which if damaged, could jeopardize aircrewman or rescue crews, to warn rescue personnel of the hazard.

2.3.9.3 Marking of equipment stowage. All stowage locations for survival equipment, fire extinguishers, etc., shall be suitably marked to identify stowed equipment and means for opening the stowage compartment.

3.3.9.4 Maintenance and preflight inspection aids. Decalcomanias shall be utilized where feasible to denote the location of critical escape system components, particularly those which are small and/or hidden and, therefore, likely to be overlooked during system maintenance quality inspection and/or preflight inspection.

3.3.9.5 Escape system preflight check-off list decal comanias. Decalcomanias, or metal foil indentification plates conforming to MIL-P-19834, shall be prepared depicting the system and indicating by key each of the critical escape system components which can be visually checked to ascertain its readiness for use. The decalcomania shall provide a list identifying each keyed component and in terse statements describe component condition (i.e.: "Safety pin - Removed." "Connector link - Connected.") required for flight status.

3.4 Interchangeability and replaceability. Parts and assemblies of all systems shall be interchangeable or replaceable in accordance with MIL-I-8500.

3.4.1 Standardization policy. To lessen the impact of the escape system upon the logistics support system, the contractor shall be guided by the provisions of MIL-S-83490 in selecting escape system components, parts, assemblies, subsystems, etc., particularly those elements requiring periodic or potentially frequent replacement.

3.5 Reliability.

3.5.1 Reliability program. The contractor shall establish, implement and document a reliability program in accordance with AR 49. The program shall be submitted, within sixty (60) days following award of contract, to the procuring activity for approval.

3.5.2 Escape system reliability design.

3.5.2.1 Probability of success. The probability of success shall be in accordance with AR 49 requirements.

3.5.2.2 Design redundancy. System components whose proper functioning is critical to the successful operation of the escape system and/or to the safety of the affected crewmember(s) either shall be provided in parallel circuits/systems so as to operate/function simultaneously (active redundancy) or shall be provided redundant actuation means (i.e.: dual firing mechanisms and ignitor systems for cartridge actuated devices).

3.5.2.3 Fail-safe operation. Critical functional elements which have several modes of operation shall be designed to ensure that any failure of the element will result in the element functioning in the mode to provide safe escape in the majority of escape conditions.

3.6 Maintainability.

3.6.1 Maintainability program. The contractor shall establish, implement and document a maintain ability program in accordance with AR 49. The program shall be submitted within sixty (60) days following award of contract, to the procuring activity for approval.

3.6.2 Escape system design for maintainability. General guidelines for designing for maintainability ease are presented in MIL-STD-889. Major scheduled maintenance, such as component replacement, shall be designed to occur at Progressive Aircraft Rework periods.

3.7 Information for Government-furnished equipment. The contractor shall submit to the Government procuring activity as soon as practical all ordering information for equipment required as Government furnished equipment (i.e.: part numbers, manufacturers and/or federal stock numbers). The submittal of this data shall be accomplished in sufficient time for the phasing-in of all Government-furnished equipment.

3.8 Design safety. The contractor shall conform to the general requirements of MIL-STD-882 when designing the escape system to ensure escape system design safety. In identifying potential problems/hazards the contractor shall develop information concerning the probability of the problems/hazard occurrence.

3.9 Escape system data requirements. The data requirements established in MIL-A-81573 shall be complied with. Data required by AS2556 concerning the propulsion subsystem and other rocket motors shall be furnished. Reports, including copies of applicable films and instrumentation records, shall be furnished in the format and quantities indicated for each test performed in accordance with MIL-E-9426. The data and records submitted shall be legible and suitable for analysis to permit the procuring activity and its support activities to conduct an evaluation of the system and its performance capabilities.

3.9.1 Escape system component/subsystem specifications. The contractor shall prepare and submit to the procuring activity for approval, specifications conforming to the. requirements of MIL-S-83490 for Form 2 specifications for components/subsystems design, test, manufacture, and quality assurance procedures not adequately defined by military or federal specifications or standards or acceptable non-governmental organization specifications or standards. Guidelines for preparing specifications are furnished in MIL-STD-490.

3.9.2 Retrofit installation data. In addition to furnishing the above data, a contractor designing, developing, testing, and producing an aircrew escape system for retrofit installation shall prepare and submit to the Government procuring activity appropriate technical directives conforming: to the requirements of AR22. The technical directives shall contain sufficient detailed assembly, installation and inspection instructions and illustrations to enable trained personnel, at the maintenance level designated by the procuring activity, to accomplish the aircraft modification work required to effect the installation.

3.9.2.1 Retrofit installation effect upon aircraft performance. The contractor shall compute the effect of the escape system installation upon the aircraft weight, balance, performance, flight characteristics, and range. In computing the effect, the contractor shall utilize worst case weight and balance data.

3.10 Escape system trainers.

3.10.1 Aircrew escape system trainer. The contractor shall prepare an aircrew escape system trainer using the cockpit section modified to replace the standard propulsion subsystem with a training propulsion subsystem simulator and to operate the inertia-locking shoulder harness take-up device pneumatically from a pressure source integral to the trainer. The design, development and testing of the aircrew escape system trainer shall conform in a general manner to the requirements of MIL-T-82341 as modified. by the procuring activity.

3.10.2 Escape system maintenance trainer. The contractor shall design, develop, test, and furnish an escape system maintenance trainer for training fleet maintenance personnel and ground crew personnel in the maintenance, preflight and postflight procedures, and safety precautions required for the escape system installation developed and supplied in accordance with this specification. The trainer shall employ the cockpit section with inert ballistic components. The trainer shall conform to the requirements of MIL-T-7755.

3.11 Quality assurance requirements.

3.11.1 Escape system service/release requirements. Prior to release of the escape system for installation and service use the requirements of 4.3 shall be satisfied.

3.11.2 Production inspection. Systems and components for (a) use in service release and/or qualification test programs or (b) delivery and/or installation under contract shall be inspected in accordance with the requirements of 4.2.6.

3.11.3 Re-use of components. As provided in MIL-E-9426 the contractor in the test program plan may propose for procuring activity approval re-use or refurbishment and re-use of components during service release perform ante testing. Such components as seats and mounting bracketry which sustain little damage during test and which require considerable time to replace may be re-used following inspection to ensure that wear resulting from previous tests will not impair escape system performance. Escape system components used in any tests may not be re-used and/or refurbished and re-used as a part of production articles.

3.11.4 In-process design compatibility inspections. During the design phase of the escape system, in-process inspections of the design shall be conducted by the Government procuring activity and/or designated field activities, as described in the following paragraphs, to ensure that the escape system design (a) is compatible with the fully-equipped aircrew and with the aircraft, and (b) conforms to the specification requirements. The inspections shall be conducted and approved in the sequence listed. In the event that corrections are deemed necessary, the procuring activity shall provide to the contractor an itemized list of the deficiencies. In the event deficiencies are identified, approval cannot be granted until corrections have been completed satisfactorily.

3.11.4.1 Mock-up. The contractor shall prepare and install an escape system mock-up. The mock-up shall be representative of the planned final design and shall be constructed in accordance with the principles and requirements of MIL-M-8650. For greatest benefit to the program, the mock-up review should be scheduled and convened as early in the program as practicable. The mock-up shall be reviewed by representatives of the Government procuring activity and/or its field activities.

3.11.4.2 Engineering proofing kit. The contractor shall prepare and install an escape system engineering proofing kit representing the "frozen" escape design. Parts need not be manufactured by production processes. For programs involving retrofit of the escape system, installation of the kit shall be conducted in accordance with formalized installation and shall be observed by representatives of the Government procuring activity and/or its field activities. It is desirable that the engineering proofing kit installation and review occur sufficiently prior to commencement of system performance tests to permit incorporation of necessary changes in the test articles.

3.11.4.3 Production proofing kit. The contractor shall prepare for installation an escape system production proofing kit. In production aircraft programs the contractor shall install the kit. In programs for the retrofit of the escape system, the installation shall be performed by personnel designated by the Government procuring activity to verify installation instructions in accordance with the requirements of MIL-M-81203. In the event the program involves both retrofit and production installation, the contractor shall prepare two kits. The kit shall represent a "frozen" design embodying all approved changes resulting from previous in-process design reviews and from testing. All parts of the kit shall be manufactured by production processes. The kit shall be inspected to ensure that (a) the components fit and interrelationships of parts are acceptable and (b) (for retrofit), the installation instructions are correct. Unless otherwise directed by the Government procuring activity, production proofing kit installations made in the aircraft shall remain in, and be delivered in (with), the aircraft.

3.11.5 Escape system baseline configurations.

3.11.5.1 Baseline configuration for service release testing. The approved escape system engineering proofing kit, demonstrating form, fit and manual functioning, shall constitute the escape system baseline configuration for service release testing. Within thirty (30) days following approval of the engineering proofing kit, the contractor shall issue sufficient drawings to describe completely the baseline configuration for service release testing.

3.11.5.2 Final baseline configuration. The final baseline configuration, that which is released and approved by the Government procuring activity for installation and service use, shall consist of the baseline configuration for service release testing with such modifications as are required to obtain escape system performance, strength, environmental protection, and component qualification conforming to the herein specified requirements. Accomplishment of such modifications shall be at no additional cost to the Government, and shall require prior approval by the Government procuring activity. Within forty-five (45) days following the completion and approval of all testing, the contractor shall compile and submit to the Government procuring activity for approval, sufficient drawings to describe completely the final baseline configuration. Accompanying the final baseline configuration drawings shall be a report describing each of the differences between the final and service release testing baseline configurations and furnishing information concerning the reasons for making the changes.

3.12 Workmanship. Workmanship shall be of the highest quality to assure optimum performance, reliability, and service life. Particular attention shall be given to freedom from defects, burrs, and sharp edges; accuracy of dimensions, radii, fillets, and markings of parts and assemblies; thoroughnesss of welding, brazing, painting, and riveting; alignment of parts and tightness of assembly screws and bolts.

3.12.1 Cleanliness. The cockpit capsule system shall be thoroughly cleaned and metal chips or other foreign matter removed during and after manufacturing and final assembly.

3.13 Escape system proposals. Proposals for production and/or retrofit incorporation of cockpit capsule systems shall conform to the requirements of AR 47.

4. QUALITY ASSURANCE PREVISIONS

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

4.2 Quality assurance test classes. Quality assurance tests required herein are classified as follows:

(a) Component/subsy stern qualification tests.

(b) Cockpit/aircrew compatibility tests

(c) Escape system environmental conditioning tests

(d) Escape system design verification tests for service release

(e) Maintainability and reliability tests

(f) Production quality control inspections and tests

4.2.1 Component/subsystem qualification tests. Component/subsystem qualification tests shall be conducted in accordance with applicable military specifications and standards. The contractor shall prepare for procuring activity approval qualification test plans and specifications for critical components/subsystems for which no military specifications or standards exist. Such specifications shall conform to the requirements of MIL-S-83490 for Form 2 specifications. In preparing the specifications the contractor shall be guided by the requirements and practices set forth in MIL-STD-490.

4.2.2 Cockpit/aircrew compatibility tests. Cockpit/aircrew compatibility tests shall be conducted in accordance with MIL-E-9426.

4.2.3 Escape system environmental conditioning tests. Escape system cockpit environmental conditioning tests shall be conducted in accordance with MIL-E-9426.

4.2.4 Escape system design verification tests for service release. Tests to verify escape system design and to demonstrate suitability for service release shall be conducted in accordance with MIL-E-9426.

4.2.5 Maintainability and reliability tests. Tests necessary to demonstrate compliance with maintainability and reliability requirements shall be conducted in accordance with AR 49.

4.2.6 Quality assurance program for acceptance of deliveries.

4.2.6.1 Non-destructive testing of critical parts. The contractor shall identify those escape system parts/components which, should they structurally fail during escape system operation or during application of crash loads, would result in an escape system failure likely to be injurious to aircrewmen. The contractor shall recommend to the Government procuring activity a program of non-destructive testing for assuring acceptable production quality of the identified critical parts/components.

4. 2.6.2 Inspection of production units. Production escape systems shall satisfactorily complete a non-destructive functional test program prior to acceptance under contract. The program shall be developed by the prime contractor and submitted via the Naval Plant Representative or the local Defense Contract Administration Office and the Aerospace Crew Equipment Department to the Government procuring activity for approval. The test program shall consist of sufficient functional tests to demonstrate overall control system performance.

4.2.6.3 Inspection procedures information sources. Information and guidance concerning inspection methods, practices and programs suitable for production quality assurance inspection of escape systems and escape systems components/subsystems are contained in, but not limited to, MIL-I-6870, MIL-C-6021, MIL-A-9067, AD 42, WR 43, FED-STD-406, MIL-STD-401 , MIL-STD-849, MIL-STD-1166, H 50, H51, MIL-HDBK-52, H53, H 55, and H 109. The contractor should utilize such of these documents and others which might be applicable in preparing the inspection procedures and program.

4.3 Escape system service release requirements. The specification conformance, functional and qualification test programs specified in 4.2.1, 4.2.2, 4.2.3, 4.2.4, and 4.2.5 for the escape system and its components must be completed satisfactorily before the Government procuring activity will grant approval of design or will release the system for installation and service use.

5. PREPARATION FOR DE LIVERY. This section is not applicable to this specification.

6. NOTES

6.1 Intended use. The cockpit capsule system is intended to provide aircrewmen a comfortable working environment in which crew efficiency is enhanced and, in emergencies, an integrated escape and survival system. In emergencies, the escape system is intended to be used to propel the aircrewmen safely out of, and away from the aircraft throughout the escape system performance envelope as herein specified. Escape systems are incorporated in aircraft to conserve trained and hard-to-replace aircrewmen. Therefore, an aircraft personnel escape system must return the aircrewmen to the earth, or ocean, in such condition that each individual is able to undertake the tasks associated with the survival and/or enemy evasion phases of his escape. Relatively minor injuries may degrade the escaped aircrewman's ability to perform these tasks and may result in his death or capture.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification

(b) Data required (see 6.3)

5.3 Data: For the information of Contractors and Contracting Officers, except for the data specified in 6.3.1, applicable documents listed in Section 2 of this specification, or referenced lower-tier documents need not be prepared for the Government and shall not be furnished to the Government unless specified in the contract or order. The data to be furnished shall be listed on DD Form 1423 (Contractor Data Requirements Lists), which shall be attached to and made a part of the contract or order.

6.3.1 Contractor specifications and other required data. Unless otherwise specified by the Naval Air Systems Command, data required under 3.2, herein, and MIL-M-81203 shall be provided. AU contractor specifications forming a part of this specification shall be submitted to the Naval Air Systems Command for approval. Copies of all specifications shall be provided to the Naval Air Systems Command; Aerospace Crew Equipment Department; the Naval Air Test Center, Patuxent River (ST35); the Naval Weapons Laboratory, Dahlgren; and the Naval Aerospace Recovery Facility, El Centro, at least forty-five (45) days prior to the date approval is required. In addition, a complete set of drawings and other pertinent information regarding the development of the ejection seat shall be furnished to the Aerospace Crew Equipment Department. The drawings shall comply with the requirements of MIL-D-1000.

6.4 Contractor efforts under tasks designated as design objectives. In the event that parts of this specification or separate tasks contractually are identified as "design objectives", the contractor shall examine each task identified to determine (a) the parameters of the task or problem, (b) possible alternative approaches for accomplishing the task or for solving the problem, (c) potential benefits and problems posed by each alternative approach or solution, and (d) the optimum approach or solution if one or more are fessible for incorporation in the escape system. The contractor shall submit to the Naval Air Systems Command; the Aerospace Crew Equipment Department,: the Naval Aerospace Recovery Facility; the Naval Air Test Center: and the Naval Weapons Laboratory, Dahlgren, for each such task and problem, a letter report describing the investigation conducted and the contractors findings and recommendations. The reports should be submitted prior to production proofing kit approval.

6.5 Safety precautions for handling explosives. Safety procedures recommended to contractors for observance during the manufacture, packaging, shipping and storage are described in MIL-STD-1314. Additional safety procedures are set forth in MIL-D-21625, MIL-D-23615 and AS 1578. These procedures and precautions are mandatory for Government activities.

6.6 Changes from previous issue. Asterisks are not used in this rev-is ion to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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*U.S. GOVERNMENT PRINTING OFFICE: 1970-433-[illegible]

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-A-23121C(AS)	AIRCREW ENVIRONMENTAL, ESCAPE AND SURVIVAL COCKPIT CAPSULE SYSTEM: GENERAL SPECIFICATION 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 papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED *(Printed or typed name and activity)*	DATE

DD FORM 1 NOV 64 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-8279