INCH-POUND
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MILITARY SPECIFICATION

ANTENNA SYSTEM, AIMS SHIPBOARD, ELECTRONICALLY STEERED OE-120/UPX

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

1. SCOPE

1.1 This specification covers the requirements for performance, technical design, and quality assurance for a Central Identification, Friend or Foe (IFF) electronically steered OE-120/UPX AIMS Shipboard Antenna System.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

MILITARY

MIL-S-901	-	Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipments and Systems, Requirements for
MIL-C-2194	-	Cables for Naval Shipboard use
MIL-C-5541	-	Chemical Conversion Coatings on Aluminum and Aluminum Alloys

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Engineering Center, Systems Engineering and Standardization Department (SESD) Code 53, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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SPECIFICATIONS (CONT'D)

MIL-A-8625	-	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-C-13777	-	Cable, Special Purpose, Electrical 34, 36, 37, 39, 40, 42, 46, 47, and 52 Conductors
MIL-E-15090	-	Enamel, Equipment Light Gray (Formula No. 111)
MIL-E-16400	-	Electronic Equipment Naval Ships and Shore, General Specification
MIL-E-17555	-	Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of
MIL-M-38510	-	Microcircuits, General Specification for
MIL-S-20708	-	Synchros, General Specification for

STANDARDS

MILITARY

MIL-STD-109	-	Quality Assurance Terms and Definitions
MIL-STD-167	-	Mechanical Vibrations of Shipboard Equipment
MIL-STD-275	-	Printed Wiring for Electronic Equipment
MIL-STD-454	-	Standard General Requirements for Electronic Equipment
MIL-STD-461	-	Electromagnetic Interference Characteristics, Requirements for Equipment
MIL-STD-471	-	Maintainability Demonstration (dated 15 Feb 1966)
MIL-STD-781	-	Reliability Design Qualification and Production Acceptance Tests: Exponential Distribution
MIL-STD-965	-	Parts Control Program
MIL-STD-1364	-	Standard General Purpose Electronic Test Equipment
MIL-STD-1378	-	Requirements for Employing Standard Hardware Program Modules
MIL-STD-1472	-	Human Engineering Design Criteria for Military Systems
MIL-STD-1635	-	Reliability Growth Testing
MIL-STD-1679	-	Weapon System Software Development
MIL-STD-2000	-	Soldering Technology, High Quality/High Reliability

(Copies of the Federal Information Processing Standards (FIPS) are available to Department of Defense activities from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. Others must request copies of FIPS from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.

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

[redacted]

3.1 Design objectives. The IFF shipboard antenna system defined by this specification is an electronically steered beam radiating antenna that also provides the required Interrogation Side Lobe Suppression (ISLS). The ISLS radiation can be omnidirectional or can be the antiphase (difference pattern) of the beam pattern. The position or direction of the radiated beam shall be controlled by a 10-bit digital command signal. Also, it shall be possible to slave the position of the beam to radar (1X and 36X) synchro data signals. When using digital input signals, the total operating cycle for positioning the beam from any bearing directly to any other bearing shall be less than 50 microseconds and the beam shall not be required to pass through intervening bearing positions. It shall be possible to slave the beam position from synchro data inputs at rotational speeds from 1 to 90 RPM. The vertical coverage of the directive beam and the omni-directional (or difference) patterns shall be as nearly identical as practical.

3.1.1 Allowable design changes. The performance requirements and the technical design approaches required by this specification are achievable through known engineering techniques. Design approaches other than specified herein shall also provide equal or better performance. Prior approval to use these other approaches is required.

3.1.2 Shipboard configurations. Because this antenna will be installed on several types of ships having various radar configurations, a versatility in the methods of installation of this antenna shall be provided. A capability for performing periodic and repair maintenance by ship's personnel shall be included for all equipments of this antenna system. These installation and maintenance capabilities shall consider the normal environmental conditions of exposure to impulses of stack gases, wind loading, ice loading, nuclear air blast, salt laden air and spray, and the temperature variations encountered throughout the world.

3.2 General requirements. The general requirements of MIL-E-16400 shall apply for the design and construction of the OE-120/UPX except as hereinafter specified.

3.2.1 Selection of parts. The selection of parts in accordance with MIL-E-16400 shall not preclude the use of parts of smaller physical characteristics, provided that the use of such parts shall be restricted to these applications whereby a saving in weight or one linear dimension of at least 25 percent can be affected.

3.2.2 Parts control. Electrical and mechanical parts to be incorporated in the equipment shall be controlled in accordance with MIL-STD-965, Procedure I.

3.2.3 Modular assemblies and sub-assemblies. Wherever modular assemblies and sub-assemblies are used in more than one location, all like assemblies and sub-assemblies shall be interchangeable without requiring adjustments or modifications. Adjustment of normal functional controls will be permitted.

3.2.4 Solid state components. Maximum feasible use shall be made of solid state components. Use of thermionic and ionizing tubes shall require prior approval, and shall be used only where no suitable solid-state devices are available, such as in the transmitter output stages. Solid state components capable of working over a broad range of temperatures shall be used wherever their use is technically feasible, and their added cost is not excessive. Microelectronic devices employed in the design of the antenna system requiring MIL-M-38510, Class B devices, shall conform to MIL-STD-454, Requirement 64.

3.2.5 Maintenance design. The equipment shall be designed to provide ease of maintenance. Extension cords, extender boards and adapter cables shall be supplied with the equipment.

3.2.6 Self testing. Self testing techniques shall be employed to the greatest extent practicable. Means shall be provided for the localization of faults to reasonably small circuit entities which are easily replaceable.

3.2.7 Connections for standard test equipment. Connections shall be readily available for such external standard test equipment as may be required for operational check-out tests.

3.2.8 Test points and test features. Test points and test features shall be provided. Self-test features and ease of fault isolations shall be emphasized.

3.2.9 Captive screws and nuts. Captive screws and nuts shall be utilized, wherever feasible, to preclude loss of hardware when equipment is disassembled for maintenance.

3.2.10 Thermal design. Forced ventilation to prevent hots spots and reduce internal temperature shall be provided where required.

3.2.11 Overload protection. Protective devices shall be provided within the equipment for protection from damage due to overload and excessive heating in accordance with the requirements of MIL-E-16400 except as modified by this specification. Prior approval for the use of low voltage blown fuse indicators is required.

3.2.12 Printed circuit boards. Where plug-in printed wiring boards are employed, they shall be in accordance with MIL-STD-275 and shall be readily removable from the chassis. Test points shall be easily accessible without withdrawing the board from its installed position. Board extenders allowing access to both sides of the board shall be provided to connect the printed circuit board into its normally connected circuitry for servicing purposes. Board extenders shall be stored within the equipment. Sufficient spacing shall be provided for adequate air circulation and to prevent accidental contact with adjacent cards during operation, testing and card extraction.

3.2.13 DC voltage test points. Test points for all direct current (DC) supply voltages (including modulator high voltage) shall be provided and shall be plainly labeled and conveniently located for ease of servicing.

if required. Mating connectors shall be furnished with all connectors, receptacles or plugs. Protective connector covers shall be provided for each cable connector.

3.2.16 Controls, indicators, and panel layouts. The design of operator and maintainer panel layouts and controls shall conform to the criteria of MIL-STD-1472 and shall be in accordance with the Controls, Indicators and Panel Layout paragraph of MIL-E-16400, except that color coding shall be in accordance with MIL-STD-1472. Tactile identification of controls is not required.

3.2.16.1 Elapsed time meters. Elapsed time meters, which shall not be resettable to zero, are required to record the time the antenna system/subsystem is operating.

3.2.16.2 Alarm lamps. Lamps used on front panels for alarms and other purposes shall conform to the requirements of the Transilluminated Displays paragraph of MIL-STD-1472. A capability for remote indication of the status of the alarm lamps shall be provided.

3.2.16.3 Power on-off indicator. An illuminated indicator(s) shall be provided that will indicate when input power is applied to the OE-120/UPX system.

3.2.17 Shock vibration and inclination. The equipment shall be capable of withstanding rough shocks during transportation and accidental shocks during actual operation. All parts of the equipment, as well as relays and other protective electrical devices shall be adequately mounted to prevent loosening, damaging, and the disturbing of settings and adjustments by shock and vibration normally encountered by equipment of this type in the Military service, as typified in 3.2.17.1, 3.2.17.2 and 3.2.17.3.

3.2.17.1 Shock. The equipment shall be capable of meeting the shock requirements of MIL-S-901 for Grade A, Class I, lightweight, Type A equipment.

3.2.17.2 Vibration. The equipment shall be capable of meeting the Type I, environmental vibration requirements of MIL-STD-167.

3.2.17.3 Inclination. The equipment shall be capable of being rested on any side and shall be capable of supporting the weight of the encased equipment plus 250 pounds distributed over an area of at least 1 square foot without damage.

3.2.18 Enclosure. The degree of enclosure shall be watertight for equipment exposed to the weather and shall be dripproof for equipment installed below decks.

3.2.19 Service environmental requirements. The equipment shall be capable of continuous operation under any combination of the following service environmental conditions:

(a) Outside air temperature, class 2 (-28 degrees C to +65 degrees C.), inside (below decks) temperature, Class 4 (0 degrees C to +50 degrees C.).
(b) Relative humidity, 0 to 95 percent.
(c) Elevation - capable of continuous operation at elevations to plus 12,000 feet.
(d) Salt laden air as encountered in a shipboard environment.
(e) Sand and dust particles 10 to 50 microns in size.
(f) Icing - (4.5 pounds per square foot (lbs/sq ft) operational and 7 lbs/sq ft non-operational).
(g) Nuclear air blast- the antenna shall be designed for an incidental freefield over pressure equal to 3 pounds per square inch with a positive phase duration of 3.5 seconds and a peak dynamic pressure of 0.2 pounds per square inch with a time duration of 3.5 seconds. The free field over pressure (Ps) and dynamic pressure (q) at any time after the arrival of the shock front are then given by the following relationships:
(h) Stack gas - Continued exposure to stack gas at 65 degrees Centigrade (C) in the presence of moisture, with the resultant residual sulphuric and sulphurous acids.

3.2.20 Finishes.

3.2.20.1 Aluminum finishes. Where practical, aluminum and aluminum alloy parts shall be anodized in accordance with MIL-A-8625. Where anodizing is not used, chemical treatment conforming to MIL-C-5541 shall be used. When required, hard anodizing shall be used.

3.2.20.2 Housed units. The finish coats for external surfaces of housed units shall be grey enamel conforming to type III, class 2 of MIL-E-15090.

3.2.20.3 Exposed units. All exterior surfaces shall be spray painted, prior to assembly with the following:

First coat Devran 1/201	light green	2-3 mils (Dry thickness)
Second coat Devran 1/201	buff	2-3 mils (Dry thickness)
Third coat Devran 1/209	No. 27 haze grey	2-3 mils (Dry thickness)

1/ Devoe Raynolds Devran, or equivalent.

3.2.20.4 Color coded markings. The requirement of 3.2.20 shall not prevent the use of color coded markings used to facilitate matching parts during installations, painted lettering for identification and instruction plates or interconnecting cables subject to handling during assembly and disassembly of the equipment.

3.2.21 Electromagnetic interference. The electromagnetic interference emission susceptibility of the equipment shall meet the applicable requirements of class IA, IB and IC in accordance with MIL-STD-461.

3.2.22 Standby to operate condition. The equipment shall be instantly operable (capable of transmitting if an IFF pretrigger is present) from standby condition at all ambient temperature specified herein when the Challenge Switch is switched to ON position.

3.2.23 Warm-up time. The equipment shall be fully operable within 10 minutes from the nonoperating condition while subjected to an ambient temperature of -28 degree C.

3.2.24 Storage. The equipment shall be capable of satisfactory operation after being stored for a period not exceeding one year at storage room ambient temperature ranges from -62 degrees C to +75 degrees C.

3.2.25 Transport requirement. The equipment shall be capable of air transport at altitudes up to 50,000 feet without damage, in nonpressurized nontemperature controlled cargo aircraft.

3.2.26 Standard hardware modules. Wherever possible, the design of this antenna system shall utilize standard modules in accordance with MIL-STD-1378. This requirement shall not restrict equipment or system design to a lesser performance than that which could be achieved through the use of modules outside of the requirements of MIL-STD-1378. Specific approval to use such non-standard modules is required.

3.2.27 Soldering. Soldering shall be in accordance with MIL-STD-2000 Task G.

3.3 Design requirements.

3.3.1 Basic system. The antenna system shall have three basic elements or sections: (1) the radiating section; (2) the RF phasing and distribution section; and (3) the control and interface section. These sections shall combine to provide:

(a) A steerable radiating beam for transmitting on 1030 Mhz and receiving on 1090 Mhz.
(b) An omni-directional (or difference) radiating pattern for transmitting on 1030 Mhz.
(c) Means for directing the beam pattern to any of 1024 separate and equi-distant bearing positions from externally supplied input command signals of 10-bit digital control words.

(d) Means for converting radar (1X and 36X) synchro data into 10-bit digital control words to slave the beam position to either an associated radar or display system or both.
(e) An indicator showing which of the 1024 positions the beam is pointing.
(f) On-line self-test functions to assure agreement of beam position with input command signals.
(g) Capability to automatically compensate for ships pitch and roll from externally supplied (other subsystem) signals. When no pitch and roll compensating signals are interconnected, the antenna system shall meet all requirements based upon the assumption of a horizontally established platform with zero roll and pitch.

3.3.2 Physical restrictions. The shape and structure of the antenna system shall be any that will be suitable to meet the aggregate requirements for installation versatility, maintenance accessibility, and technical performance. A circular array for the radiating section appears to have several benefits over phased linear arrays, but the use of phased linear arrays is not excluded. Whichever is used, a repairable structure is mandatory. It must be relatively simple to install and require the minimum use of top-side area. It must be so constructed to permit shipment by normal means over the road by trucking, across the sea by normal cargo vessels, and through the air by normal air cargo (military or commercial) planes. Replacement of any portion of the antenna system shall not require the ship to be returned to a special repair base. Modular design should be utilized as much as practical and sectionalizing the radiating section is considered highly desirable to permit mounting around masts and towers as well as upon deck houses and platforms.

3.3.3 Weight and size. The size of the radiating section shall be as small as practical. For the circular array, the diameter shall not exceed 13 feet. For the phased linear array, the length of each section shall not exceed 14 feet. The structural cross section of either type shall not exceed 2 feet to permit a useful central opening for mounting around towers or masts. The weight of the section(s) mounted on the mast or platform shall be kept to a practical minimum. If cables are to run from a deck mounted unit, the array (less cables) shall be less than 400 pounds for the circular and 800 pounds for the total of the phased linear arrays. If the RF distribution section (or a part thereof) is combined with the radiating section, the combined weight shall be less than 800 pounds for the circular array, or 1200 pounds for the phased linear array. If these weight limitations cannot be met, request for waivers will be considered when technical justifications accompany the request.

3.3.3.1 Distribution section. The size and weight of the distribution section shall be kept to the practical minimum for the design method chosen. Because the various methods are not physically similar, no limitations will be set. Prime importance is the performance of the chosen design. However, maintainability and size shall be important factors as well.

3.3.3.2 Control and interface section. The size and weight of the control and interface section shall not exceed the values given below.

Size (inches) 56H - 22W - 18D
Weight (pounds) 240

3.3.4 Radiating section characteristics. As a minimum capability, the radiation section shall provide the following.

(a) Directive beam

Beamwidth: 5.8 degrees to 7.8 degrees azimuthal
40 degrees to 60 degrees vertical
Voltage standing wave ratio (VSWR): 1.5 to 1, or less
Gain of main lobe: Overall gain of at least 13.5 decibels isotropic (dBi). Losses in the RF section may exceed 4.5 decibels (dB) but shall not exceed 7.5 dB. Overall gain of the main lobe shall be at least 13.5 dBi, including the RF section for at least 90 percent of the possible beam positions and at least 13.0 dBi for the remaining beam positions. The gain at any particular beam position shall not deviate by more than 0.5 dBi from the overall mean.
Polarization: Vertical transmit frequency, 1030 megahertz (MHz)
Receive frequency: 1090 MHz
Transmit peak power: 5 kilowatts (kW) at input to units 2; 0.5 to 10 microsecond (μs) pulses at 0.02 duty cycle
Switching time: Less than 50 μs from one position to any other positions
Bearing positions: 1024 equidistant steps through 360 degrees
Synchronization: A - 10-bit digital word
B - Radar (1X and 36X) synchro data, 60 hertz (Hz)
Secondary lobes: The side lobe levels shall be at least 20.5 dB (1030 MHz) and 18.7 dB (1090 MHz) below the main lobe for at least 90 percent of the possible beam positions and at least 15 dB below main lobes for the remaining beam positions.

(b) Omni-directional pattern

Polarization: Vertical
Vertical beamwidth: 40 degrees to 60 degrees, to match vertical coverage of beam pattern

Magnitude variations: The omni-pattern variations in horizontal magnitude (scalloping) shall be within 4.5 dB peak-to-peak
Transmit frequency: 1030 MHz
Receive frequency: (None)
Transmit peak power: 5 KW, at input to unit 2, 0.5 μs to 1.0 μs pulses at 0.004 duty cycle
VSWR: 1.5 to 1, or less
Gain: The omni-pattern shall be at least 1.5 dB above the side lobe structure for at least 95 percent of the possible beam angular position and at least 0 dB above side lobe structure for the remaining beam positions.

(c) Indication of beam position. It is required that the direction of the radiated beam be indicated at a remote position, preferably at the control and interface unit(s). The indication shall be in units of one degree (0 degrees - 359 degrees) unless there is a technical benefit to indicate the bearing in one-third degree units. However, this latter method is not desired from a human engineering point of view. In addition to the indication of bearing, there must be an indication that the position is relative or true bearing. Both types will be utilized but not simultaneously.

(d) On-line test functions. Automatic on-line testing functions shall be provided to assure that the direction of the radiated beam is in fact corresponding (within appropriate system tolerances) to the direction of the input command signals. Automatic alarming at a remote position, preferably at the control and interface unit(s), shall occur when the radiated beam is at a bearing not correct for the input command signals. This alarming shall also occur whenever excessive lead or lag errors, or slow switching times indicate steering performances beyond the acceptable system tolerances.

3.3.5 RF distribution section characteristics. This section shall provide three basic functions: (1) provide the phasing and selection of the RF energy paths to the radiating section for transmitting the beam pattern; (2) provide the same beam pattern for receiving target replies; and (3) provide the phasing and selection of RF energy paths for transmitting the omni-directional pattern for ISLS. The design of the RF distribution section may utilize any of the following methods:

(a) Switched taper feed
(b) Butler matrix
(c) R2R lens
(d) The average RF insertion loss from the input of the distribution section to the input of the antenna programmer (unit 2) shall not exceed 7.5 dB
(e) RF Cavity
(f) Other (when specifically approved)

3.3.5.1 RF distribution section design. The design of the RF distribution section must achieve minimum attenuation, good main beam to secondary beam ratio, a high degree of reliability, accessibility for repair and maintenance servicing, and versatility in the methods of installation. The optimum design for any one feature may not combine favorably with the optimum design of other features. Therefore, the following priority is established to assist in determining technical trade offs for the final design (listed in descending order of importance).

Minimum attenuation
High degree of reliability
Accessibility for maintenance and repair
Ratio of main beam to secondary beams (side lobes)
Versatility of installation methods

3.3.5.2 The following information is provided as guidance to understanding the design limits considered acceptable as a compromise in accomplishing the priorities of 3.3.5.1.

(a) The RF attenuation (losses) from the input of the distribution section to the input of the radiating elements shall be less than 4.5 dB but a need exists to achieve something less than 3.0 dB.
(b) Mean time between failures shall be not less than 1000 hours for above deck components and 500 hours for below deck components.
(c) Easy access to all component parts shall be possible. This requirement includes the radiating sections if portions or all of the radiating section. The mean time to repair (MTTR) shall be not more than four hours (worst case).
(d) To achieve the best combined design of a, b, and c, the following reduction in main beam characteristics may be considered. However, prior approval for any reduction must be obtained before using these values:

Main beam gain	15 dB
Secondary beams	18 dB below main beam
Omni-pattern	no change

(e) The requirement for versatility of installation methods may be reduced to a non-versatile method with prior approval.

3.3.6 Control and interface section characteristics. The control and interface unit(s) shall provide the control of performance of the antenna system for both the radiate and the receive functions. The following features are minimum requirements:

(a) Beam direction from a 10-bit input signal (digital)
(b) Beam direction from radar synchro input signals (1X and 36X).
(c) Beam direction from self generated input signals.
(d) ISLS from internal switching functions.
(e) Indication of the bearing of the beam position
(f) On-line self test features to assure proper direction of the radiated beam.
(g) Self-test and fault isolation maintenance capability.
(h) Automatic compensation for beam error due to ship's pitch and roll (utilizing pitch and roll signals from ship's system).

3.3.6.1 Beam direction from 10-bit input signals. It shall be possible to control the position of the beam using a 10-bit digital word supplied from an external source. The bearing, or direction shall change in a consecutive and clockwise manner through 1024 equal change increments. Ship's heading (relative bearing) shall be 00000000000. The following characteristics define the type of input signals with which the antenna system must interface.

(a) Zero near ground potential; ones minus 15 volts
(b) Zero near ground potential; ones minus 3 volts
(c) Zero near ground potential; ones plus 3.5 volts

3.3.6.2 Beam direction from synchro data. It shall be possible to control the position of the beam using synchro data (1X and 36X) input signals. The 360 degrees of rotation shall be achieved in 1024 equal change increments similar to the performance achieved in 3.3.6.1.

3.3.6.3 Self-generated beam position. It shall be possible to control the position of the beam from self-generated signals. The type of signals may be synchro data or digital (electronic counter). The rate of beam rotation shall be adjustable from a front panel control from 0 to 90 (approximate) revolutions per minute (rpm). In addition, a synchro output shall be provided capable of driving at least a type 23CT6 synchro unit in accordance with MIL-S-20708.

3.3.6.4 Beam positioning modes. From a front panel control(s) it shall be possible to select any one of the following modes of beam positioning:

(a) Directed position (from 10-bit input word).
(b) Sectoring across a directed position (from a 10-bit input word).
(c) Directed sequential rotation (from 10-bit words, or synchro data).
(d) Free run sequential rotation (from internal signals).

3.3.6.5 ISLS operation. The ISLS switching function shall be provided in this antenna system. An external trigger (from the interrogator) will be supplied to initiate this switching function. Whenever this trigger is not present, the antenna shall be in the beam position. Upon receipt of this trigger, the antenna shall provide the omni-pattern (or difference pattern) for the duration of the ISLS pulse and immediately return to the beam pattern. For Modes 1, 2, 3/A and C, this ISLS pulse (P2) occurs 2.0 microseconds after the first pulse (P-1) of the interrogation pair (P1-P3). For Mode 4, this ISLS pulse follows the four synchronizing pulses forming a symmetrical five pulse group. Switching action must be rapid to provide a suitable P3 pulse in the Mode 1 challenge wherein the P1-P3 spacing is three microseconds. This requires the switching of the ISLS (P2) pulse to be complete in less than one microsecond. The external trigger pulse supplied to initiate the ISLS operation shall have the characteristics specified in a through d:

a. Pulse amplitude: 10 volts peak minimum (min) to 80 volts peak maximum (max), positive.
b. Pulsewidth: 0.2 μs to 1.0 μs
c. Drive capability: Shall be capable of driving a 75-ohm load
d. Direct current (DC) level in pulse OFF state: In the absence of a pulse, the DC output level shall not exceed +0.6 volts.

3.3.6.6 Bearing indication of the main beam. A direct reading indicator shall be provided that continuously identifies the bearing (position) of the main beam. A minimum acceptance design of this feature will be a designation of the command position signals (beam direction) within the RF distribution switching section. A designation of only the input command signals will not be acceptable. It is recognized that much of the switching of beam position will occur more rapidly than the human mind can perceive. However, this fact

does not remove this requirement. In addition to the readout indicator, a capability shall be provided to remote this indication through an isolated output.

3.3.7 Input power connector. Input power shall be supplied through a separate connector on all units unless specifically approved to include this interconnection via a multipurpose cable. If input power is required to the mast-mounted equipment, provisions shall be made to prevent personnel from being exposed or harmed by dangerous voltage as specified in the Safety (personnel hazard) paragraph of MIL-E-16400.

3.4 Test, measurement and diagnostic equipment (TMDE). Test provisions for the equipment shall conform to MIL-STD-454, Requirement 32, except as specified herein.

3.4.1 Test point criteria. Except for shop testing, test points shall be accessible (1) with the removal of no more than one cover panel, (2) while the equipment is operational, and (3) without removal of any cables or connectors. The use of extender boards is permitted to allow access to test points on printed circuit cards. Test points shall be provided for the following requirements. Multiple use of test points is permitted.

(a) Signal quality and circuit performance. Test points, test jacks, or both, shall be provided to permit the injection of signals and the monitoring of signals at the input and output terminals of the System, each Unit and each Assembly.
(b) Alignment. Test points, test jacks, or both, shall be provided to energize, inject a standard dynamic signal, or monitor the intermediate circuit affected by the alignment. Where TMDE is used to align or adjust a system, unit, assembly and subassembly, circuitry shall be designed such that a technician can see and operate the TMDE while making adjustments and probing the circuit under test.
(c) Fault isolation. Test points, test jacks, or both, shall be provided to permit the injection and measurement of signals at input and output terminals of the unit, assembly and subassembly to determine satisfactory operation or malfunction of the unit, assembly, or subassembly.
(d) Shop testing. Shop testing of assemblies and subassemblies will be performed with the assemblies and subassemblies removed from the prime equipment. Test points shall be provided so that the assembly can be (a) activated (such as DC and dynamic signals applied), (b) checked for quality of operation and (c) fault isolated to the shop replaceable item (such as, flatpack, VCO, mixer, detectorm multiplier and TO-5 can). Assembly and subassembly test points shall be provided in a single connector. Assembly and subassembly test points, when approved, may be placed at various nodes or locations on the assembly and subassembly.

3.4.2 General purpose electronic test equipment (GPETE). GPETE for use at all levels of maintenance shall be selected from the Standard and Substitute Standard GPETE listed in MIL-STD-1364.

3.4.3 Special tools. Special tools shall be supplied in accordance with MIL-STD-454, Requirement 63. Special tools shall meet the storage and operating environmental conditions specified for the prime equipment. (See 6.3).

3.4.4 Built-in test equipment (BITE).

(a) BITE shall be provided for the following levels:

(1) Level A BITE shall provide a GO, NO-GO indication of the system performance. Level A BITE as a minimum shall indicate a failure when:

(a) The beam position is in error by greater than one degree from the position required by the input position command signal less any corrections for deck tilt (pitch and roll) and heading.
(b) The ISLS switching function fails or is lacking.
(c) VSWR of the antenna system is greater than 1.5:1.
(d) Any critical voltage which exceeds its normal value by more than five percent.

(2) Level B BITE shall provide a GO, NO-GO indication of quality and performance of the antenna and each below deck assembly; such as: antenna drive, antenna control, power supply.

(3) Level C BITE shall indicate and isolate failure or malfunction to the subassembly, (such as: Antenna section, printed circuit cards) without disassembly or trial-and-error replacement. The AN/UPM-137 AIMS test set may be used with Level C BITE to fault locate to the subassembly level.

(b) BITE activation.

(1) Level A and level B BITE activation shall be automatic and shall not require operator initiation.
(2) Level C BITE activation may be automatic or manual.

(c) GO, NO-GO indicators. Level A and Level B indicators for below deck equipment shall be uncovered and plainly visible at all times. Level C indicators may be covered or uncovered. If covered, they shall be made visible by the removal of no more than one cover plate.

(1) Indicators for level A BITE shall be lights, meters or other indicators installed on the system control panel. Alarms shall also be provided in the form of flashing lights, installed on the control panel. Provision shall be made for repeating all indicators for level A BITE and their alarms at a remote location.
(2) Indicators for level B BITE shall be provided on the front panel of each below deck unit or assembly. For above deck assemblies, indicators shall be installed on the below deck control panel.
(3) Indicators for level C BITE shall be provided on a surface of each subassembly visible from the maintenance positions.

(d) Dependability.

(1) Level A BITE shall detect system failure not less than 99 percent of the time.
(2) Level B BITE shall isolate not less than 96 percent of the detected system failures to a single subassembly, and (b) may isolate 4 percent of the detected failures to a group of two subassemblies. The number of subassemblies in a group for a single failure shall not exceed three unless specific approval is granted.

(e) Calibration and maintenance.

(1) Tests points, test jacks, or both, shall be provided for injecting signals into the BITE and monitoring the responses of the BITE for a given check. The calibration features shall be located as follows:

(a) Level A BITE: On the control panel of the System.
(b) Level B BITE: On the assembly front panel.
(c) Level C BITE: On the subassembly.

(2) The calibration and malfunction of BITE shall not affect the operation of the prime equipment.

3.5 Reliability requirements.

3.5.1 Quantitative reliability requirements. The OE-120/UPX shall have a lower test mean-time-between failures (MTBF) (θ, as defined by MIL-STD-781), of 1000 hours for unsheltered (above deck) equipments, and 500 hours for sheltered (below deck) equipments.

3.6 Maintainability requirements.

3.6.1 Quantitative maintainability requirements. The equipment repair time (ERT) shall be as follows:

Above deck equipment

Specified equipment repair time (ERT) 1.5 hours
Maximum equipment repair time (ERT_{max}) 4.0 hours

Below deck equipment

Specified equipment repair time (ERT) 10 minutes
Maximum equipment repair time (ERT_{max}) 30 minutes

3.6.2 Qualitative maintainability requirements. The equipment shall be constructed to provide ease of maintenance, accessibility and replacement of all modules and parts. Each of maintenance, trouble-shooting and repair shall be a primary design consideration.

3.7 Workmanship screen. All equipments shall withstand a defect detection virbration screen of random type vibration at $0.04g^2/Hz$ ± 3 dB from 80 Hz to 350 Hz and temperature cycling as specified in 4.5.4.

3.8 Leakage current. The leakage current of each equipment which stands alone, each rack or cabinet of equipment, and each equipment which can be removed and carried to a maintenance area for servicing shall not exceed 5 milliamperes (MA).

3.9 Resource allocation and reserves. Resource allocation and reserve requirements specified in the Resource allocation and reserves paragraph of MIL-STD-1679 shall be applied to computer software and firmware development. The 20 percent reserves as specified in the Resource allocation and reserves paragraph of MIL-STD-1679 are exclusive of growth requirements.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection,

as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Government verification. All quality assurance operations performed by the contractor will be subject to Government verification at any time. Verification will include (a) surveillance of the operations to determine that practices, methods, and procedures of the written quality program are being properly applied, (b) Government product inspection to measure quality of product to be offered for acceptance, and (c) Government product inspection of delivered products to assure compliance with all inspection requirements of this specification. Failure of the contractor to promptly correct deficiencies discovered by him or of which he is notified shall be cause for suspension of acceptance until corrective action has been made or until conformance of product to prescribed criteria has been demonstrated.

4.1.2.1 Failures. The contractor shall, at no additional cost to the Government, correct all failures or deficiencies which occur during all inspections or tests (including workmanship screening and equipment conditioning), analyze the failures and deficiencies, determine the corrective action required, and implement and demonstrate the effectiveness of the corrective action to the satisfaction of the Government.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in Section 4.5.

4.4 Quality conformance inspection. Quality conformance inspections shall be as specified in table I.

4.5 Tests and examinations. The tests and examinations described hereinafter are either modified or additional requirements to the inspection procedures as specified in MIL-E-16400. All other examinations and tests shall be in accordance with the inspection procedures of MIL-E-16400.

4.5.1 Surface examinations. The STM model shall be examined for conformance with the workmanship, assembly, fit, safety, identification, marking, materials, parts, treatments, and finish of MIL-E-16400.

4.5.2 Operating test. The antenna system shall be energized and subjected to an operating test to insure the proper functioning and performance at an adequate number of points in the required range to demonstrate conformance to specification requirements, including safety. The operating test shall verify the proper operations of all manual and automatic functions, and on-line self-test functions.

4.5.2.1 Operating test duration and conditions. The contractor shall subject the OE-120/UPX to a continuous operating test of 48 hours at approximately 25°C (room ambient) with the total functions operating. If a failure occurs during the first 24 hours, the equipment (after correction) shall be retested for the full 48 hours duration. If a failure occurs after 24 hours, the equipment (after correction) shall be tested for the remaining time with a minimum of 8 hours of successful operation without further failures. During this operating test, the monitoring of the equipment performance shall include, as a minimum requirement, the functional checks to assure proper operation under the most stringent operating mode. No adjustments of the equipment other than normal operating adjustments shall be allowed during the operating test.

4.5.3 Inspection of preparation for delivery. Inspection shall be conducted to insure conformance with the requirements of section 5.

4.5.4 Workmanship screen. Vibration (see 4.5.4.1) and temperature cycling (see 4.5.4.2) shall be performed on each equipment. Vibration shall be performed prior to temperature cycling. The screen shall be performed after surface examination (see 4.5.1) and prior to the operating test (see 4.5.2). The vibration may be performed at the module, drawer, or unit level. All the hardware, including cables and connectors, shall be exposed to vibration.

4.5.4.1 Vibration. The vibration shall be random, or subject to procuring activity approval, pseudo-random or complex waveform vibration, for an accumulated time of 10 minutes, with the last 5 minutes failure-free, using single axis random vibration at 6g's rms, .04g^2/Hz from 80 to 350 Hz with a 3 dB drop off from 80 to 20 Hz and from 350 to 2000 Hz. Axis of vibration shall be perpendicular to the plane of the boards. All items shall be hard-mounted (without shock isolators) and subjected to the vibration conditions of FIGURE 1. Input vibration levels shall be measured at the mounting points of the item under vibration. If variations are found at these points, the level used for control purposes shall be the average of the levels at the mounting points. Control equipment having a bandwidth no greater than 10 Hz for vibration frequencies up to 500 Hz and 100 Hz for vibration frequencies above 500 Hz shall be used for the control and analysis of the acceleration spectral density (ASD). The instantaneous acceleration peaks shall be limited to three times the root-mean-square (rms) acceleration level. The item shall be energized during vibration and appropriate input signals applied to observe any abnormal conditions of the output functional characteristics. All failures occurring during screening shall be corrected and the vibration resumed.

4.5.4.2 Temperature cycling. Each module, drawer, or unit shall be subjected to 10 failure-free cycles, with the last 5 consecutive cycles failure-free, of the temperature curve shown in FIGURE 2. Temperature cycling will be between -54°C and +71°C for a 2 hour cycle in which the temperature rate of change is not less than 10°C per minute. The module, drawer, or unit shall reach stabilization at -54°C with cold turn-on after temperature rise to -28°C and performance measurement at -28°C. Hot dwell and performance measurement shall occur at +71°C. Hot turn-off shall be after the performance measurement. Where performance measurements are called for, a minimal functional operating test shall be performed. The dwell times shall be

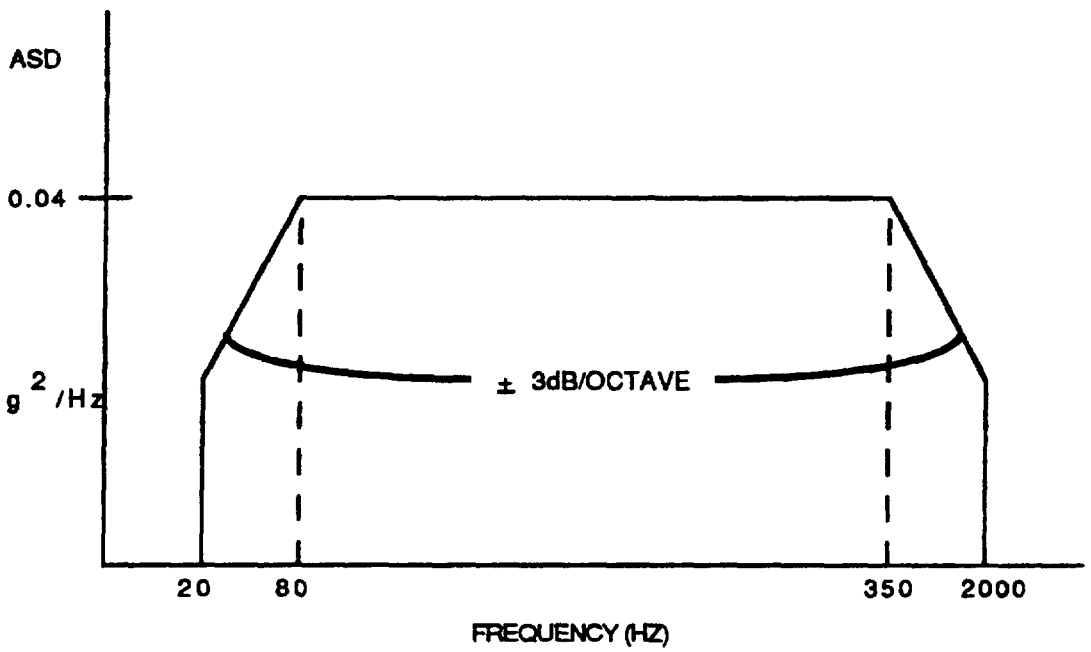
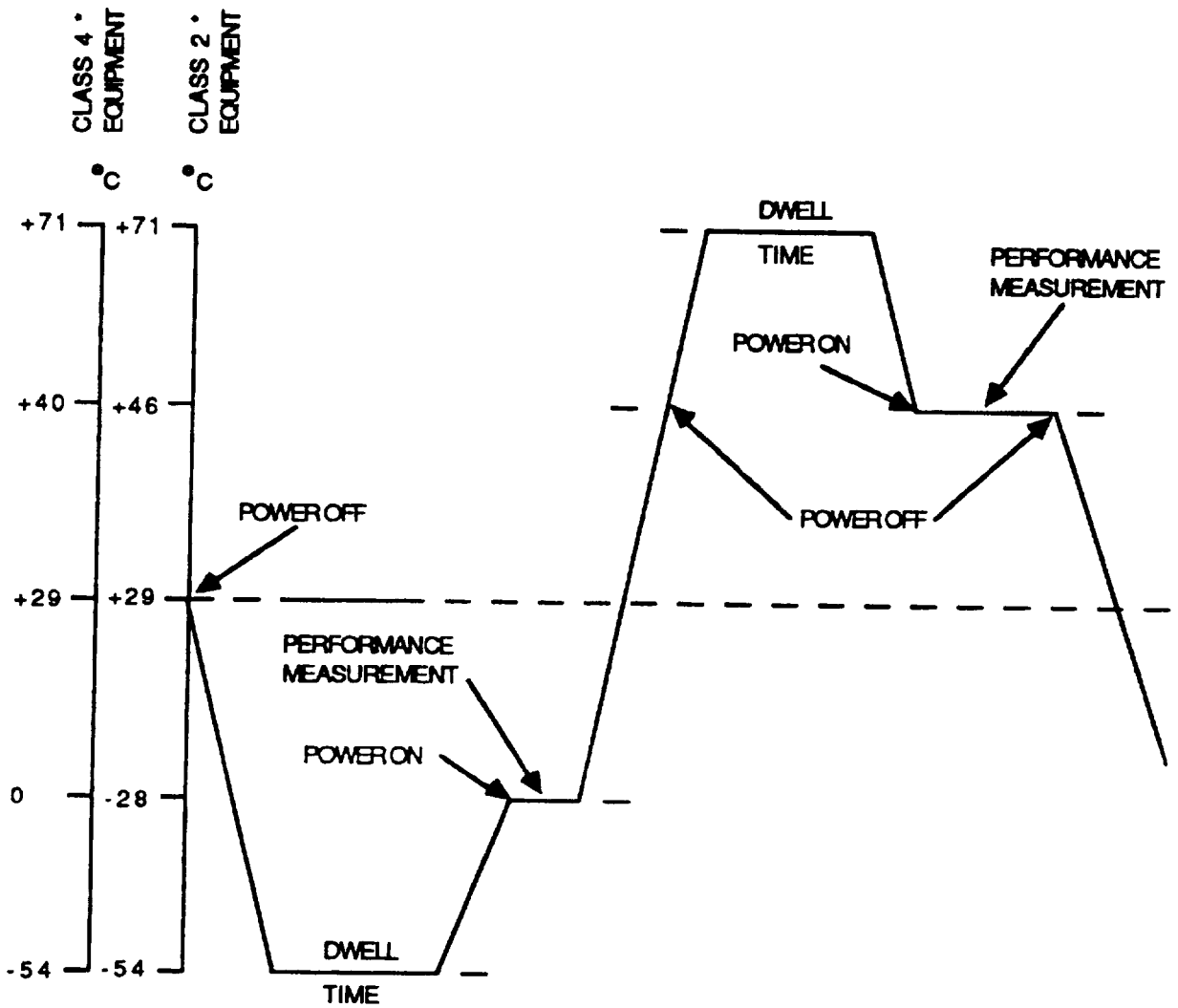


FIGURE 1. Random vibration curve. (see 4.5.4.1)



* CLASS OF EQUIPMENT AS SPECIFIED IN MIL-E-16400

FIGURE 2. One cycle of temperature curve (not to scale). (see 4.5.4.2)

TABLE I. Quality conformance inspection

Inspection	Requirement Paragraph	Test Paragraph
Surface examination	3.2 & 3.3	4.5.1
Weights and dimensions	3.3.3	4.5
Operating test	3.3	4.5.2
Controls and control circuits	3.2.16	4.5
Temperature test	3.15	4.5
Enclosure test	3.2	4.5
Inspection of Preparation for Delivery	5.	4.5.3
Power	3.2	4.5
Supply line voltage and frequency	3.2	4.5
Shock test	3.2.17	4.5
Inclination	3.2.17	4.5
Vibration test	3.2.17	4.5
Salt spray	3.2.19	4.5
Humidity	3.2.19	4.5
Reliability demonstration test	3.5	4.6
Maintainability demonstration test	3.6	4.7
Support maintenance test procedure verification	3.4	4.8
Electromagnetic interference emission and susceptability and self compatibility	3.2.21	4.5
Workmanship screen	3.7	4.5.4
Leakage current	3.8	4.5.5

maintained until the largest electrical or electronic part in the module, drawer, or unit shall be stabilized. Total on-time shall be not less than 80 minutes in a 120 minute period.

4.5.5 Leakage current test. Leakage current shall be performed once on each different item of equipment in the system.

WARNING

THIS TEST MAY BE HAZARDOUS DUE TO THE UNGROUNDED CONDITION OF THE EQUIPMENT DURING THE TEST. DO NOT TOUCH EXPOSED METAL SURFACES WITHOUT ADEQUATE ELECTRICAL SHOCK PROTECTION.

THE UNITED STATES GOVERNMENT NEITHER ASSUMES NOR ACCEPTS RESPONSIBILITY FOR ANY INJURY OR DAMAGE THAT MAY OCCUR DURING OR AS A RESULT OF THIS TEST.

4.5.5.1 Equipment test connections. After power removal, each equipment directly connected to an external power source and units deriving power from the equipment shall be placed on an insulated surface. All safety ground conductors between the equipment and units deriving power from the equipment shall be intact. The safety ground conductor between the equipment and the source power shall be opened during the test. The equipment shall be connected as shown on FIGURE 3.

4.5.5.2 Measurement. Leakage current shall be measured on equipment in its normal operating configuration at 115 volts, 60 Hz and 400 Hz. Equipment controls in each operating mode shall be such that maximum power will be utilized during leakage current measurements. The leakage current shall be determined by the voltage-drop method. A true rms voltmeter shall be used. The voltage measured across the 1500-ohm resistor, when equal to 7.5 volts, represents 5 mA of leakage current. The overall measurement error shall not exceed five percent. The probe shall be used on all external conducting parts such as case, connector housings, recessed calibration or adjustment controls, and control shafts with knobs removed. The voltage shall be measured from each part to ground for every combination of switch positions available in FIGURE 3. The open safety ground conductor shall be reconnected immediately after the test is completed.

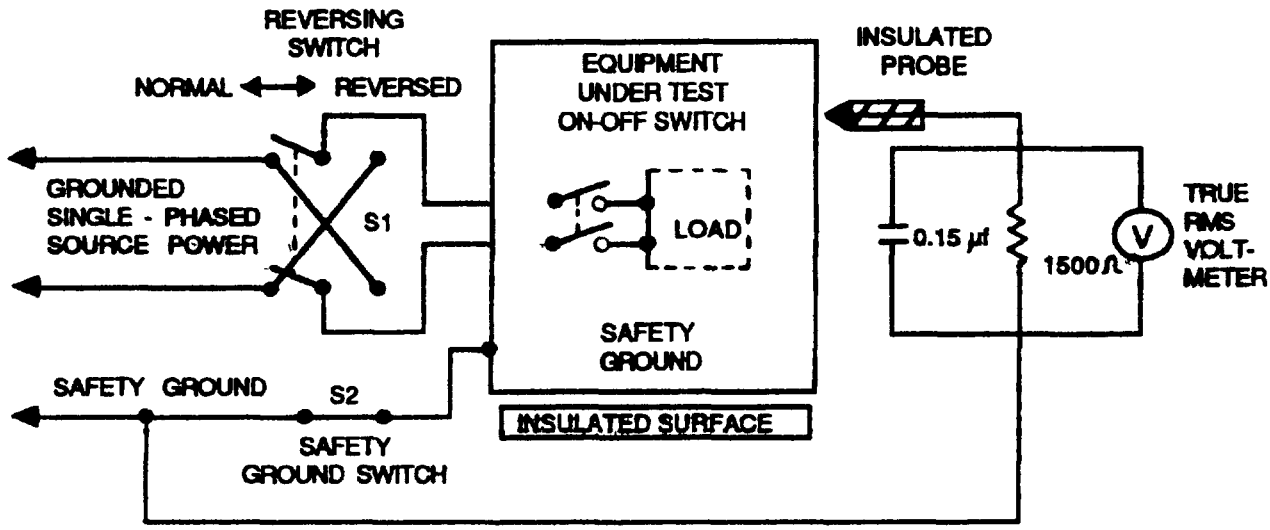
4.5.6 Leakage test. Each antenna radiating element of the circular array shall be totally submerged in water and pressurized to 3.0 pounds per square inch through the RF connector to test for pressure leakage. Any antenna radiating element with evidence of air leakage shall be resealed and the pressure leakage test repeated. Test duration for each antenna radiating element shall be 10 minutes, minimum.

4.6 Reliability demonstration tests.

4.6.1 Reliability demonstration. A reliability demonstration shall be performed in accordance with Test Plan XXC of MIL-STD-781 for sheltered and unsheltered equipments, as appropriate, using the test conditions of the test condition matrix (see TABLE I). Continuous functional operational testing in each operational mode shall be accomplished during extremes and normal environmental conditions, whenever possible.

4.6.2 Failure. (See 6.2.2) The failure definitions and categories shall be as defined in MIL-STD-781 with the final decision resting with the procuring activity. Any operating discrepancy or degradation that requires an unscheduled adjustment or calibration to be made, after initial satisfactory operation of the equipment under test, shall be defined as a relevant failure.

4.6.3 Pattern failures. In the event pattern failures (as defined by MIL-STD-781) occur during any testing, the contractor shall immediately notify the procuring activity. The procuring activity shall have the authority to continue the test; start another test; require the contractor to conduct a test, analyze, and fix (TAAF) program in accordance with MIL-STD-1635; or continue acceptance. The TAAF test environment shall be equivalent to the test environment in which the pattern failure occurred. The Government has the authority to determine patterns of failure.



GENERAL ORDER OF TEST:

1. Source power OFF. Connect equipment per diagram.
2. ON-OFF SW OFF. S1 SW normal. S2 SW closed. Connect source power
3. OBSERVE WARNING S2 SW OPEN. ON - OFF SW ON.
4. For each probe point, record voltmeter reading (CASE, CONNECTORS, CONTROLS, SHAFTS)
5. ON-OFF SW OFF. Repeat Step 4.
6. S1 SW REVERSED. ON-OFF SW ON Repeat Step 4
7. ON-OFF SW OFF Repeat Step 4
8. S2 SW CLOSED S1 SW normal
9. Repeat Step 3 THRU 8 for each mode of operation
10. Remove source power Disconnect equipment Sign record sheet

WARNING
DO NOT TOUCH EXPOSED METAL SURFACES

THIS TEST MAY BE HAZARDOUS DUE TO THE UNGROUNDED CONDITION OF THE EQUIPMENT DURING THE TEST. THE UNITED STATES GOVERNMENT NEITHER ASSUMES NOR ACCEPTS RESPONSIBILITY FOR ANY INJURY OR DAMAGE THAT MAY OCCUR FROM THE USE OF THIS DIAGRAM FOR LEAKAGE CURRENT MEASUREMENT

FIGURE 3 Single - phase test diagram for leakage current measurement (see 4.5.5.1).

4.7 Maintainability demonstration. The maintainability requirements shall be demonstrated in accordance with Method 4 of MIL-STD-471. A separate demonstration shall be performed for the above deck and below deck equipments. The equipments shall be configured as a system for the maintainability demonstration. The maintainability requirements shall be successfully completed prior to the delivery of any equipments. The maintainability demonstration shall be performed after completion of first article testing.

4.8 Support maintenance test procedure verification. The support maintenance test procedure verification test will demonstrate compliance with the test measurement and diagnostic requirements of paragraph 3.4.

(a) Sample - The support maintenance test procedure verification shall be performed on the service test model.
(b) Test procedures - The test procedures used in the Support Maintenance Test Procedure Verification shall be procedures of the technical manual or the developed procedures.
(c) Test personnel - The support maintenance test procedure verification shall be performed by a technician selected by the government from contractor or Government personnel.
(d) Test equipment, jigs, and tools.

(1) General purpose electronic test equipment used in the support maintenance test procedure verification shall be selected from the approved list of GPETE specified in 3.4.2.

(2) The contractor shall furnish all jigs, fixtures, interface devices, tools and test equipment required to perform the tests of the support maintenance test procedure verification.

(e) Assemblies and subassemblies - The contractor shall furnish a complete set of unaligned assemblies and subassemblies.

(f) Depot and intermediate tests - The technician shall:

(1) Align each assembly and subassembly (if required).
(2) Verify that each assembly and subassembly is operating properly.
(3) Verify that each assembly and subassembly can be fault isolated to a circuit (such as, VCC, Mixer, Flatpack, and Filter).
(4) Verify the threshold and accuracy of built-in test equipment.

(g) Organizational level tests - The technician shall:

(1) Install the assemblies and subassemblies in the prime equipment and verify.
(2) Verify the operation of built-in TMDE.

(3) Operate the equipment in all modes. If the equipment does not meet all specification operating requirements except environmental, the technician shall trouble shoot the equipment, repair the equipment, and repeat the organizational level tests.

4.9 Quality assurance terms and definitions. Quality assurance terms used in this specification and classification of defects shall be as defined in MIL-STD-109.

4.10 Inspection of packaging. The sampling and inspection of the preservation, packing, and container marking shall be in accordance with the requirements of MIL-E-17555.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. Preparation for delivery requirements of referenced documents listed in Section 2 do not apply unless specifically stated in the contract or order. Preparation for delivery requirements for products procured by contractors shall be specified in the individual order.)

5.1 Preservation and packaging, packing, and marking. The equipment, accessories, technical publications, and repair parts shall be preserved, packaged, packed, and marked as specified in the contract or order.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

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

(b) STM subjected to STM test and inspection (see 4.3).

6.2 Definitions.

6.2.1 On-line test functions. Automatic on-line testing functions provided to assure that the direction of the radiated beam is in fact corresponding (within appropriate system tolerances to the direction of the input command signals).

6.2.2 Failure. The term failure refers, in reliability demonstrations, to any malfunction or parameter deviation that prevents the equipment from performing to full capability in all modes, in the specified operational environment, to the operating parameter levels set forth herein.

6.2.3 Subassembly. Two or more parts which form a portion of an assembly but having parts which are individually replaceable (i.e., modules and printed circuit boards with components).

6.2.4 Assembly. A number of parts or subassemblies or any combination thereof, joined together to perform a specific function and capable of disassembly. (Such as, audio amplifier, synthesizer, crystal oscillator.)

6.2.5 Unit. An assembly or any combination of parts, subassemblies and assemblies mounted together, normally capable of independent operation in a variety of situations (such as, transmitter, receiver, and so forth).

6.2.6 Test, measurement and diagnostic equipment (TMDE). TMDE is all instruments, devices (electrical, electronic, mechanical, magnetic, or chemical, and so forth), tools and interface equipment used to: test, observe, measure, monitor, modify, generate, calibrate and control physical properties, movements and other characteristics. This includes power sources, modifiers, scalers, jigs, templates, monitoring devices, waveguides, standards and programming software required to test, measure, and diagnose.

6.3 Special tools. Special tools are defined as those tools not listed in the National Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Service (DCAS)) (see 3.4.3)."

6.4 Subject term (keyword) listing.

Antenna, Radiating, Steered Beam
BITE, Built-In Test Equipment
Components, Solid State
IFF, Identification Friend or Foe
ISLS, Interrogation Side Lobe Suppression
Phasing, RF
Radiation, Beam Pattern, Antiphase
Radiation, Omnidirectional
Signal, Digital Command, 10-bit
Signal, Syncro Data, (1X and 36X)
Ventilation, Forced

Preparing Activity:
NAVY-AS
(Project 5985-N591)

INSTRUCTIONS In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-A-29563(AS)	ANTENNA SYSTEM, AIMS SHIPBOARD, ELECTRONICAL STEERED OE-120/UPX

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)* _____
b. ADDRESS *(Street, City, State, ZIP Code)*	

5. PROBLEM AREAS

a. Paragraph Number and Wording

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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