

MILITARY SPECIFICATION

ANTENNA AT-505/AP

1. SCOPE

1.1 This specification establishes the requirements for Antenna AT-505/AP which is a pressure-sealed single-slot flush-mounted broadband airborne antenna.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on the date of invitation for bids, form a part of this specification:

SPECIFICATIONS

Military

MIL-C-17	Cables, Radio Frequency; Coaxial, Dual Coaxial, Twin Conductor, and Twin Lead
MIL-C-71	Connectors, "N" For Radio Frequency Cables
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification For
MIL-E-5400	Electronic Equipment, Aircraft, General Specification For
MIL-S-6872	Soldering Process, General Specification For
MIL-T-9107	Test Reports, Preparation Of
MIL-P-15037	Plastic-Material, Laminated, Thermosetting; Sheets, Glass-Cloth, Melamine-Resin
MIL-P-17555	Preparation For Delivery Of Electronic Equipment; Miscellaneous Electrical Equipment (Except Rotating Electrical Equipment) And Associated Repair Parts

STANDARDS

Military

MIL-STD-130 Identification Marking of U. S. Military Property

DRAWINGS

U. S. Air Force

56D13026 Antenna AT-505/AP, Assembly Of

(Copies of documents required by contractors in connection with specific procurement functions should be obtained from the procuring or as directed by the contracting officer.)

### 3. REQUIREMENTS

3.1 Preproduction.- This specification makes provisions for preproduction testing.

3.2 General Specification.- The requirements of MIL-E-5400 for class 2 equipment apply as requirements of this specification with the exceptions and additions called out herein. When the two specifications conflict, this specification shall govern.

3.2.1 Soldering.- Cleaning flux, such as sal amoniac, shall not be used. Alcohol may be used for cleaning after tinning and soldering. All rosin deposits shall be removed. Mechanical loads shall not be imposed on soldered connections. Soldering shall meet all the requirements of MIL-S-6872.

3.3 Design and Construction.- The design and construction of the antenna shall have the dimensions and general features shown on Drawing 56D13026.

3.3.1 RF Connectors.- The rf connector included as a part of the antenna assembly covered by this specification shall be UG-680/U or equivalent and shall be in accordance with MIL-C-71.

3.3.2 RF Cable.- The rf cable included as a part of the antenna assembly covered by this specification shall be RG-141/U and shall be in accordance with MIL-C-17.

3.3.3 Antenna Interior.- The antenna shall be filled with gas-expanded foamed plastic similar to NOFCO LOCKFOAM with a 6-pound density. This is a closed cell type with a power factor of approximately 0.002 and dielectric constant of 1.13.

3.3.4 Antenna Window.- The antenna window shall be of laminated glass-cloth material in accordance with MIL-P-15037.

#### 3.3.5 Mechanical

3.3.5.1 Pressure-Sealed Construction.- The antenna shall be sealed at all points so that moisture cannot leak into the interior when subjected to the immersion tests specified in 4.2.5.

3.3.5.2 Pressure-Tight Mounting Flange.- The mounting flange of the antenna shall be constructed for mounting in an opening in the skin of an aircraft. Its purpose shall be to effectively prevent the escape of air from a pressurized aircraft at this point.

#### 3.4 Performance

3.4.1 Voltage Standing Wave Ratio (VSWR).- At all frequencies between 400 mc/s and 480 mc/s the VSWR shall be equal to or less than 2.0 to 1.0 when measured on a 50-ohm transmission line feeding the antenna.

3.4.2 Radiation.- The relative level of energy radiated from the antenna shall not vary more than 10 percent above or below the level outlined in the test procedures specified in 4.2.7.2.

3.4.3 Impedance.- The nominal impedance of the antenna assembly shall be 50 ohms.

3.4.4 Radiation Pattern.- The antenna, when mounted in the center of a large horizontal ground plane, shall provide vertically polarized radiation of essentially uniform intensity over 360 degrees of azimuth. The radiation pattern of the antenna assembly shall not be less than 60 degrees wide at the half-power points in any plane perpendicular to the mounting plane.

3.5 Resistance to Environmental Effects.- The antenna shall withstand the environmental requirements for class 2 equipment of MIL-E-5400 without reducing the electrical or mechanical performance below the limits specified herein.

3.6 Weight.- The antenna shall be of the lightest weight consistent with the other requirements of this specification and in no event shall the installed weight of the antenna exceed 2.0 pounds. Installed weight shall include the complete antenna assembly with nameplate and receptacle, but shall not include cabling external to the antenna, plugs, mounting nuts or bolts, or any mounting bracket or fastening device which is not an integral part of the antenna assembly.

3.7 Identification of Product.- Each antenna shall be marked with the nomenclature, serial number, contract number, and the letters "U. S." markings shall be in accordance with the applicable requirements of MIL-STD-130.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Classification of Tests.- The inspection and testing of the antenna shall be classified as follows:

- a. Preproduction tests . . . Sec 4.2
- b. Acceptance tests . . . . Sec 4.3

#### 4.2 Preproduction Tests

4.2.1 Preproduction Test Sample.- Three each Antenna AT-505/AP shall be subjected to the preproduction tests. Tests shall be performed at the contractor's plant or other approved facility. All preproduction items shall be considered to be a requirement over and above the number required for production installation and may be destroyed during test.

4.2.2 Test Report.- After completion of the preproduction tests by the contractor, three copies of a complete report, certified by an authorized

official of the organization performing tests, shall be furnished to the procuring activity. The test report shall be in accordance with MIL-T-9107. The preproduction test report shall be submitted simultaneously with the preproduction samples.

4.2.3 Drawings.- Three copies of drawings which show modifications to Air Force drawings, if any, shall be supplied with the preproduction test sample when specified in the contract.

4.2.4 Preproduction Tests.- Preproductions tests shall consist of the following tests and the acceptance tests.

4.2.5 Environmental Test Data.- The antenna shall be subjected to the following test procedures of MIL-E-5272. Performance of the equipment during environmental tests shall be as specified under the electrical tests of 4.2.7.

High temperature	Procedure I
Low temperature	Procedure II
Temperature shock	Procedure II
Humidity	Procedure I
Altitude	Procedure II
Salt-spray	Procedure I
Vibration	Procedure I
Sand and dust	Procedure I
Immersion	Procedure I
Temperature-Altitude	Procedure I
Shock	Procedure II

#### 4.2.6 Service Condition (Special)

4.2.6.1 Mechanical Strength.- A sample antenna shall be proof tested at a differential pressure of 30 psi applied on the back side of the cavity. The case shall not rupture nor shall permanent set due to pressure deflection be allowed. An electrical performance test shall be conducted.

4.2.6.2 Dynamic.- An antenna assembly shall be placed in a climate chamber and subjected to 100 cycles of pressure variation from 30 inches of mercury to 2.0 inches at a rate of approximately 0.5 inch per second. The percentage of humidity shall be maintained at approximately 90 percent at atmospheric pressure and room temperature. After cycling, the antenna shall be opened and examined for internal moisture.

4.2.7 Electrical Performance.- Subsequent to environmental tests specified in 4.2.5 and dynamic test specified in 4.2.6.2, the antenna shall be subjected to the following tests:

4.2.7.1 Voltage Standing Wave Ratio.- The voltage standing wave ratio shall be determined in accordance with the best commercial procedure when the antenna is mounted centrally on and flush with the surface of a

circular ground plane not less than 60 inches radius. Measurements shall be made at 5 mc/s intervals from 400 mc/s to 480 mc/s inclusive. At all frequencies between 400 and 480 megacycles per second the voltage standing wave ratio shall be equal to or less than 2.0 to 1. It shall also be determined that the VSWR is not affected when operating with a differential pressure of 20 psi applied on the back side of the cavity.

4.2.7.2 Radiation Test.-- The radiation test shall consist of connecting the antenna through a 50-foot length of RG-21/U cable to a monitored signal source tuned to one frequency within the frequency range of the antenna and observing the relative level of energy radiated from the antenna as indicated in the output meter of an rf receiving device tuned to the same frequency as the signal source. The relative level of energy radiated from the antenna shall not vary more than 10 percent above or below the level of a matched dipole 440 mcs mounted one-quarter wave length from a reflecting surface or value as supplied by the procuring activity for this purpose. The dipole shall be externally matched so as to present the same impedance to the signal source as the antenna.

4.2.7.3 Radiation Pattern.-- The radiation pattern of the antenna assembly shall be measured in accordance with standard commercial practice to determine compliance with 3.4.4. A circular ground plane of at least 60 inches radius shall be used.

4.3 Acceptance Tests.-- Acceptance tests shall consist of:

- a. Individual tests
- b. Sampling tests

4.3.1 Individual Tests.-- Each test set shall be subjected to the following tests.

4.3.1.1 Mechanical.-- A visual inspection of the test set shall be made to verify that the materials, design and construction, necessary mechanical measurements, marking, and workmanship comply with the requirements of this specification. Each antenna shall be subjected to the immersion test of 4.2.5.

4.3.1.2 Electrical Performance Tests.-- Each antenna shall be subjected to the VSWR test of 4.2.7.1.

4.3.2 Sampling Tests.-- Test samples shall be selected at random in accordance with the following:

<u>Quantity of Item on Order</u>	<u>Quantity of Item to be Tested</u>
1 to 25	1
26 to 50	2
51 to 75	3

Quantity of Item  
on Order

76 to 125  
126 to 200  
201 to 300  
Over 300

Quantity of Item  
to be tested

4  
5  
6  
One for each additional  
100 on order

4.3.2.1 Sampling Test Procedure.-- Each test item (see 4.3.2) shall be subjected to the preproduction tests specified herein.

5. PREPARATION FOR DELIVERY

5.1 General.-- Preparation for delivery shall be in accordance with MIL-P-17555.

5.2 Shipment Marking.-- The shipment marking nomenclature shall be Antenna AT-505/AP.

6. NOTES

6.1 Intended Use.-- The AT-505/AP is intended for use with airborne receiving and transmitting equipment in the frequency range from 400 to 480 megacycles per second. It is intended to be flush mounted with the skin of the aircraft in a pressurized compartment.

6.2 Ordering Data.-- Procurement documents should specify conditions for the following:

6.2.1 Preproduction Test Samples.-- It is expected that the contract or purchase order will specify that a minimum of three antennas will be required for preproduction samples and that these preproduction samples will be subjected to the preproduction tests to determine compliance with the requirements of this specification. These antennas should be considered as an additional quantity since it may not be economical to repair and deliver these antennas as production items. The invitation for bids and the contract should specify the point of inspection for these tests.

6.3 The right is reserved to reject any materials which have not been subjected to the required tests and found satisfactory.

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any

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other person or corporation, or conveying any right or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

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