

INCH-POUND

MIL-DTL-25895A  
w/AMENDMENT1  
06 March 2012  
SUPERSEDING  
MIL-DTL-25895A  
04 January 2007

## DETAIL SPECIFICATION

## ANTENNA AT-505/AP

This specification is approved for use by all Departments  
and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. 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 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract (see 6.2).

## DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-17	-	Cables, Radio Frequency, Flexible and Semi-rigid, General Specification for.
MIL-E-5400	-	Electronic Equipment, Aerospace, General Specification for.
MIL-I-24768/1	-	Insulation, Plastic, Laminated, Thermosetting, Glass-Cloth, Melamine-Resin (GME).
MIL-PRF-39012	-	Connectors, Coaxial, Radio Frequency, General Specification for.

## DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	-	Identification Marking of U. S. Military Property.
MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests.

(Copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

Comments, suggestions or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, or emailed to [Tubesamps@dsc.dla.mil](mailto:Tubesamps@dsc.dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil>.

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2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DRAWINGS

U. S. AIR FORCE

56D13026 - Antenna AT-505/AP, Assembly of.

(Copies of these documents are available online at [403.scms.qued.workflow@wpafb.af.mil](mailto:403.scms.qued.workflow@wpafb.af.mil) from the Aeronautical Systems Center, 88 OSS/OSE, Bldg. 280 Door 4, 4170 Hebble Creek Rd., Wright-Patterson AFB, OH 45433-5653.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

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. This specification shall govern when there is conflict between two specifications.

3.2.1 Soldering. Cleaning flux, such as sal ammoniac, 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 accepted industry standards.

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-PRF-39012](#).

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-DTL-17](#).

3.3.3 Antenna interior. The antenna shall be filled with gas-expanded foamed plastic similar to NOPCO 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-I-24768/1.

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](#).

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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. The purpose shall be to effectively prevent the escape of air from a pressurized aircraft at this point.

3.3.6 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of the antenna components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.4).

3.4 Performance.

3.4.1 Voltage Standing Wave Ratio (VSWR). At all frequencies between 400 MHz and 480 MHz, 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 procedure 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." Marking shall be in accordance with the applicable requirements of MIL-STD-130.

3.8 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. Antenna provided shall be new and unused.

3.9 Workmanship. Antennas shall be manufactured and processed in a careful and workmanlike manner in accordance with good engineering and production practices. The antennas shall be free from tool marks, deep scratches, and other defects that will affect life, serviceability, or appearance.

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## 4. VERIFICATION

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

- a. Preproduction tests (see 4.2).
- b. Acceptance tests (see 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 acquiring activity. 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. Preproduction 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 methods of MIL-STD-810. Performance of the equipment during environmental tests shall be as specified under the electrical tests of 4.2.7.

High temperature	Method 501.5
Low temperature	Method 502.5
Temperature shock	Method 503.5
Humidity	Method 507.5
Low pressure (altitude)	Method 500.5
Salt fog	Method 509.5
Vibration	Method 514.6
Sand and dust	Method 510.5
Immersion	Method 512.5
Temperature-altitude	Method 520.3 (tailored)
Shock	Method 516.6

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.

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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 (VSWR). VSWR shall be determined in accordance with 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 MHz intervals from 400 MHz to 480 MHz inclusive. At all frequencies between 400 and 480 MHz, the VSWR 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 MHz mounted one-quarter wave length from a reflecting surface or value as supplied by the acquiring 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 (see 4.3.1).
- b. Sampling tests (see 4.3.2).

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

4.3.1.1 Mechanical. A visual inspection of the test 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 items on order</u>	<u>Quantity of items to be tested</u>
1 to 25	1
25 to 50	2
51 to 75	3
76 to 125	4
126 to 200	5
201 to 300	6
Over 300	One for each additional 100 on order

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

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5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

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

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. 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 preproduction items. The invitation for bids and the contract should specify the point of inspection for these tests.
- c. Shipment marking. Shipment marking nomenclature is Antenna AT-505/AP.

6.3 Rejection materials. 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 acquisition 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 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.

6.4 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

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6.5 Subject term (key word) listing.

Acceptance tests  
Electrical performances  
Environmental tests  
Preproduction tests  
Pressure-sealed  
Pressure-tight mounting flange  
Radiation pattern  
RF cable  
RF connectors  
VSWR

6.6 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmentally Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website at <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see [section 3](#)).

6.7 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Custodians:  
Air Force – 85  
DLA – CC

Preparing activity:  
DLA – CC

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