

MIL-A-25487B (USAF)
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SUPERSEDING
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MILITARY SPECIFICATION
ANTENNA AT-172()/ARN-14

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

1. SCOPE

1.1 Scope. This specification covers the general mechanical and electrical requirements for design of an omnirange aircraft antenna for use in the frequency range of 108 to 122 MHz.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: WR-ALC/MMEDTA, Robins AFB, GA 31096-5609 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter

AMSC N/A

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FSC: 5826

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SPECIFICATIONS

MILITARY

MIL-P-116	-Preservation, Methods of
MIL-E-5400	-Electronic Equipment, Aerospace, General Specification for
MIL-E-17555	-Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of
MIL-C-39012/96	-Connectors, Coaxial, Radio Frequency, Series SMB (Uncabled-Receptacles, Male Printed Circuit, Right Angle, Class 2)
MIL-C-83231	-Coating, Polyurethane, Rain Erosion Resistant for Exterior Aircraft and Missile Plastic Parts

STANDARDS

MILITARY

MIL-STD-129	-Marking for Shipment and Storage
MIL-STD-130	-Identification Marking of U. S. Military Property
MIL-STD-810	-Environmental Test Methods & Engineering Guidelines
MIL-STD-831	-Test Reports, Preparation of

2.1.2 Other Government documents, drawings, and publications.

The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DRAWINGS

U.S. AIR FORCE

56C13327	-Antenna AT-172/ARN - Outline dimensions of
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(Copies of specifications, standards, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, ((except for associated detail specifications, specification sheets, or MS standards) the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS.

3.1 Preproduction. This specification makes provisions for preproduction testing.

3.2 General specification. The requirements of MIL-E-5400 for class 1 equipment apply as requirements of this specification, with the exceptions and additions called out herein. When the two specifications conflict, this specification shall govern.

3.3 Materials.

3.3.1 Fungus. Materials which are not nutrients for fungi shall be used to the greatest possible extent. The antenna shall not suffer any deterioration in performance, electrical or mechanical, when subjected to the fungus test specified in 4.3.4.1.

3.3.2 Erosion resistance. Plastic materials used in the external coating of the antenna shall meet the requirements of MIL-C-83231.

3.3.3 Materials. Recycled and recovered raw materials should be used to the maximum extent possible in lieu of virgin raw materials as long as these materials do not jeopardize the intended use and fully comply with all contract requirements. Materials used shall be free from defects which would adversely affect their performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. None of the above shall be interpreted to mean that the use of used or rebuilt products will be allowed.

3.4 Design. The general design including the envelop dimensions and mounting dimensions shall be as specified on Drawing 56C13327. The antenna shall receive horizontally polarized signals with a minimum reception of vertically polarized signals. The antenna shall be connected to the receiver through a coaxial cable of 52 ohms characteristic impedance. The antenna is intended for installation on the top or bottom of the fuselage of slow and medium speed aircraft.

3.5 Construction. The antenna shall consist of a slot, cavity, loop, dipole, array, or other system for installation on aircraft, consistent with the position in which it is to be installed.

3.5.1 Sealing. The antenna system shall be constructed so that water or other liquid will be incapable of collecting in any portion of the antenna system when subjected to the rain tests specified in 4.3.4.1.

3.6 Performance.

3.6.1 Radiation pattern. The radiation pattern of the antenna

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in the horizontal plane, when installed in the center of a flat circular ground plane of at least 2 wavelengths in diameter, shall not vary more than 6 decibels between maximum and minimum at any azimuth angle.

3.6.2 Input Impenance. The input impedance shall be such that the voltage standing wave ration (VSWR) in reference to 52 ohms shall not exceed 5 to 1 over the range of 108 to 122 MHz.

3.6.3 Gain. The gain of the antenna in the forward direction in the horizontal plane shall not be more than 8 decibels below that of a simple air-insulated dipole antenna mounted parallel to and 18 inches above the same ground plane at 115 MHz. Both antennas shall be oriented for maximum gain at zero elevation with respect to the ground plane surface. The gain in the horizontal direction at any frequency from 108 to 122 MHz shall not be more than 3 decibels below the gain at 115 MHz.

3.6.4 Polarization. The antenna shall be designed for minimum reception of vertically polarized radiation. In the frequency range of 108 to 118 MHz, the reception of vertically polarized signals from any horizontal direction with respect to the antenna shall be 14 decibels below the reception of horizontally polarized signals from the same direction. The ground plane used shall be the same as used in 3.6.1.

3.6.5 Radio frequency connectors. The antenna connector shall be designed to accommodate Plug UG-21/U in accordance with MIL-C-39012/96.

3.6.6 Icing. The antenna shall withstand any ice load built up as a result of aircraft operation under severe icing conditions at high speed.

3.6.7 Aerodynamic drag. That portion of the antenna which protrudes into the air stream shall cause a minimum drag and in no case shall this drag exceed 8 pounds at 250 knots at sea level.

3.6.8 Wind thrust loads. The antenna shall be capable of withstanding concentrated loads applied at the outer extremity of the main structure of the antenna, of 200 pounds applied at right angles to line of flight, and 500 pounds in direct line of flight.

3.6.9 Vibration. The antenna shall be capable of withstanding the vibration tests specified in 4.3.4.1 without damage to the antenna system or deterioration of its performance.

3.6.10 Humidity. The antenna shall be capable of withstanding the effects of humidity when tested as specified in 4.3.4.1 without damage to the antenna system or deterioration of its performance.

3.6.11 Temperature shock. The antenna system shall be capable of withstanding the effects of temperature shock without

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deterioration in performance when subjected to the tests specified in 4.3.4.1.

3.6.12 Salt fog. The antenna system electrical performance or mechanical properties shall not be affected when subjected to the salt fog test specified in 4.3.4.1.

3.7 Weight. The antenna system shall have a minimum weight which is consistent with the design and structural requirements.

3.8 Identification of product. The identification marking of the antenna system shall be located as shown in Drawing 56C13327, shall be in accordance with MIL-STD-130 and shall contain the following information:

Nomenclature
Stock number
Serial number
Manufacturer's name or code
U. S.

4. QUALITY ASSURANCE PROVISIONS

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

- a. Proproduction tests See 4.3
- b. Acceptance tests See 4.4

4.2 Test conditions. Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of mercury and a temperature of approximately 25°C (77°F).

4.3 Preproduction tests.

4.3.1 Proproduction test samples. When specified in the contract, a minimum of three antennas shall be subjected to the preproduction and the acceptance tests specified herein.

4.3.1.1 Samples for procuring activity. Three complete antenna systems including balun, filters, matching devices, etc, shall be submitted to the procuring activity at the time the manufacturer submits the preproduction test report for approval. These antennas shall be used by the Government for the following:

- a. A review of the electrical characteristics and mechanical construction of the antenna.
- b. The performance of any tests deemed necessary after a review of the manufacturer's report of tests on the preproduction sample.

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4.3.2 Preproduction test program. Prior to any formal preproduction testing of the sample antenna, the manufacturer shall submit a draft of its proposed test program for approval to the procuring activity. The draft shall include the procedures and equipment used in performing the preproduction tests specified herein.

4.3.3 Preproduction test report. After completion of the preproduction tests by the manufacturer, three copies of the complete report shall be furnished to the procuring activity. The test report shall be in accordance with MIL-STD-831 and shall include the name and grade of all materials used in the antenna.

4.3.4 Tests.

4.3.4.1 Environmental tests. The test samples shall be subjected to environmental tests in accordance with Table I as specified in MIL-STD-810.

TABLE I. Environmental tests.

Test	Method No.	Procedure
Humidity	507.1	I
Vibration	509.1	I
Fungus	514.1	I
Temperature Shock	508.1	I
Rain	506.1	I

4.3.4.2 Mechanical test.

4.3.4.2.2 Pull tests. The loads specified in 3.6.8 shall be applied through a clamping pad formed to fit the contour of the top of the antenna to prevent extreme localized pressures. The load shall be applied for a period of 1 hour in each direction. Upon completion of the pull tests, there shall be no permanent displacement nor evidence of structural deformation.

4.4 Acceptance tests. Acceptance tests shall consist of the following:

- a. Individual tests.
- b. Sampling tests.

4.4.1 Individual tests. Each antenna shall be submitted to the following tests:

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4.4.1.1 Visual inspection. Antennas shall be visually inspected to insure that materials, workmanship, and assembly of the antennas meet the requirements of this specification.

4.4.1.2 Voltage standing wave ratio. The VSWR measurement shall be made at a minimum of 5 frequencies, 2 of which cover the extremes of the 108 to 122 MHz band. These measurements shall be made with the antenna mounted on a flat circular ground plane of at least 2 wavelengths in diameter.

4.4.2 Sampling tests. Sampling tests shall be conducted on one antenna system of each group of 50 or fraction thereof contained in the contract. Samples submitted for sampling tests shall be selected by the procuring activity and shall first have passed the individual tests. The sampling test may include any other preproduction tests which are deemed necessary by the procuring activity.

4.4.3 Inspection of packaging. The sampling and inspection of the preservation, packing and container marking shall be in accordance with MIL-P-116 as required by MIL-E-17555.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-E-17555.

5.2 Marking for shipment. In addition to any special or other identification marking required by the contract, each unit and exterior container shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. Antenna AT-172()/ARN-14 is intended for use with Radio Receiving Set AN/ARN-14 to receive localizer, omnidirectional range, and communication signals.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Stock number
- c. Preproduction samples and tests.
 - (1) Number of preproduction samples.
 - (2) Point of inspection.
 - (3) Requirement for concurrent delivery of each sample and its test data. The procuring activity should be given at least 10 days prior notice when the preproduction tests are to be conducted so that they may be witnessed, if desired, by a Government rep-

representative.

6.3 Patent 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 other person or corporation, or conveying any rights or permission to manufacture, use or sell any patented invention that may be related thereto.

6.4 Subject term (key word) listing.

Aerodynamic drag
Aircraft antenna
Dipole
Gain
Ground plane
Horizontally polarized
Omnirange
Radiation pattern
Vertically polarized
VSWR

6.5 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
99

Preparing activity:
Air Force - 84

Agent:
Air Force - 99

Project number: 5826-F167

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL*(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**

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2. DOCUMENT TITLE**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)**

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)