

INCH-POUND

MIL-DTL-25627D

12 January 2016

SUPERSEDING

MIL-T-25627C

20 December 1966

DETAIL SPECIFICATION

TRANSMITTER, SYNCHRO, ANGLE OF ATTACK OR SIDESLIP

Reinstated after 12 January 2016 as inactive for new design.

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

1. SCOPE

1.1 Scope. This specification covers the requirements of angle of attack or sideslip synchro transmitters.

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.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5541	-	Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-S-7742	-	Screw Threads, Standard Optimum Selected Series General Specification for
MIL-A-8625	-	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-DTL-83488	-	Coating, Aluminum, High Purity

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	-	Identification Marking of U.S. Military Property
MIL-STD-461	-	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment
MIL-STD-704	-	Aircraft Electric Power Characteristics

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Columbus, Attn: VAI, P.O. Box 3990, Columbus, Ohio, 43218-3990 or emailed to Sound@dsccl.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.dla.mil/>.

AMSC N/A

FSC 6610



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MIL-STD-810	-	Environmental Engineering Considerations and Laboratory Tests
MIL-STD-889	-	Dissimilar Metals
MS24378	-	Transmitter, Synchro, Angle of Attack or Sideslip

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-454	-	General Guidelines for Electronic Equipment
MIL-HDBK-838	-	Lubrication of Military Equipment

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

2.3 Non-Government publications. The following documents 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.

ASME INTERNATIONAL

ASME-Y14.100	-	Engineering Drawing Practices
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(ASME documents may be obtained online at <http://www.asme.org/>.)

2.4 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 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.3 Materials.

3.3.1 Fungus-proof materials. Materials that are nutrients for fungi shall not be used where it is practical to avoid them. Where used and not hermetically sealed, they shall be treated with a fungicidal or fungi static agent acceptable to the procuring activity. However, if they will be used in a hermetically sealed enclosure, fungicidal treatment will not be necessary.

3.3.2 Metals. Metals shall be of the corrosion-resistant type or suitably treated to resist corrosion due to fuels, salt spray, or atmospheric conditions likely to be met in storage or normal service.

3.3.2.1 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.3.3 Nonmagnetic materials. Nonmagnetic materials shall be used for all parts of the transmitter except where magnetic materials are essential.

3.3.4 Corrosive fumes. The materials as installed in the transmitter and under the service conditions specified herein shall not liberate deleterious fumes.

3.3.5 Protective treatment. When materials are used in the construction of the transmitter that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of any protective coating that will crack, chip, or scale with age or extremes of climatic and environmental conditions shall be avoided.

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 loudspeaker components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.3).

3.4 Design and construction. The transmitter shall conform to MS24378-2 and shall be designed to measure the angles of airflow with respect to an arbitrary reference line. The range of measurement shall be from -30 ± 0.25 degrees to $+30 \pm 0.25$ degrees. The transmitter shall be so designed and constructed that no parts will work loose in service. It shall be built to withstand the strains, jars, vibrations, and other conditions incident to shipment, storage, installation, and service.

3.5 Performance. The transmitter shall be capable of meeting the requirements specified herein under the following conditions:

- a. Temperatures – operating temperatures ranging from -54 degrees to +93 degrees C and storage temperatures ranging from -64 degrees to +71 degrees C
- b. Humidity – relative humidity up to 100 percent including conditions wherein condensation takes place in the form of both water and frost
- c. Salt spray – exposure to salt sea atmosphere for a period of 50 hours
- d. Vibration – vibration incident to service use
- e. Rain – rainfall as encountered in any locale
- f. Sand and dust – sand and dust particles as encountered in desert areas
- g. Fungus – fungus growth as encountered in tropical climates
- h. Acceleration - acceleration forces up to 10g
- i. Misalignment – operation without misalignment between the sensing element and the rotor of the synchros
- j. Power characteristics – operation with aircraft power having characteristics in accordance with MIL-STD-704
- k. Aerodynamic alignment – aerodynamic alignment when displaced from 0.3 degrees to 30 degrees at 100 ± 5 knots
- l. Heating element endurance – operation for 40 cycles consisting of 10 hours with power on and 2 hours with power off
- m. Endurance – satisfactory operation over the entire range for 30,000 cycles. A cycle is travel of the sensing element from one position limit to the opposite position limit and return to the starting position limit.

3.5.1 Operational characteristics. The transmitter shall respond to change of 0.2 degrees of angular deviation of the airstream into which it is inserted throughout a speed range of 90 to 125 knots with an accuracy of 0.25 degrees. The transmitter shall respond to a change of 0.1 degrees of angular deviation of the airstream throughout the speed range of 125 knots to mach 3.0 with the accuracy of 0.2 degrees.

3.5.2 Radio noise suppression. Radio noise suppression shall be in accordance with MIL-STD-461.

3.5.3 Damping and time constant. With the transmitter mounted in an airflow of 110 ± 5 knots and the

sensing element displaced 3 degrees in both directions, the sensing element shall return to 0 degrees within 0.5 degrees maximum overshoot.

3.6 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements in accordance with ASME-Y14.100 shall govern the manufacturer's part numbers and changes thereto.

3.7 Output synchro transmitter. There shall be two independent signal outputs. A 50 degrees angular change of the sensing probe shall correspond to a 135 degrees rotation of both synchros. The synchro transmitter shall be Clifton Precision Products CGC-10-AS-7 or an electrical equivalent.

3.8 Electrical connector. The pins of electrical connector shall be connected to the synchros in [table I](#).

TABLE I. Electrical connector.

Electrical connector pins	Winding
Pins A and F (negative leads)	Single-phase winding C
Pins B and G (positive leads)	Single-phase winding H
Pins C and H	Three-phase winding X
Pins D and I	Three-phase winding Z
Pins E and J	Three-phase winding Y

3.9 Heating element. An electrical heating element shall be provided within the sensing element which shall have a rating in accordance with MS24378-2. A sufficient area of the heater shall be so concentrated near the base of the sensing element that the junction of the sensing element and the fuselage will be kept free of ice. The heater shall be automatically regulated in such a manner that the power dissipated through the heater will be an inverse function of the heater element temperature. In still-air ambient temperatures of 20 degrees to 30 degrees C, the heater element shall not dissipate more than 135 W.

3.10 Probe alignment. Electrical zero shall correspond to a sensing element set at midpoint on the range of the sensing element movement. This shall correspond to 0 ± 0.1 synchro degrees with respect to a reference line through the sensing element axis and perpendicular to the centerline joining the dowel pins show on MS24378-2.

3.11 Synchro transmitter electrical zero. The procedure for determining the electrical zero shall be as specified in [4.2.6](#).

3.12 Weight. The weight of the transmitter and connector shall not exceed 2.25 pounds.

3.13 Screw threads. Unless otherwise specified, the threads of all machine screws shall conform to MIL-S-7742.

3.14 Lubrication. Materials for the lubrication of the transmitter shall be selected and applied using MIL-HDBK-838 as guidance.

3.15 Finishes and protective coatings.

3.15.1 Aluminum alloy parts. Aluminum alloy parts shall be covered with an anodic film conforming to MIL-A-8625, except as follows:

- a. Small holes and case inserts need not be anodized.

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- b. Aluminum alloys that do not anodize satisfactorily shall be coated with a chemical film in accordance with MIL-DTL-5541.
- c. Where the primary purpose of the treatment is to afford a suitable paint base, chemical treatments in accordance with MIL-DTL-5541 in lieu of anodizing shall be used.
- d. Castings containing nonaluminum alloy integral inserts may be treated with a chemical film in accordance with MIL-DTL-5541 in lieu of anodizing.
- e. When abrasion resistance is a factor, chemical films in accordance with MIL-DTL-5541 shall not be used in lieu of anodizing.

3.15.2 Steel parts. Steel parts shall be coated with ion vapor deposited aluminum, where practicable, in accordance with MIL-DTL-83488 type I or II as applicable and of a class that is adequate to achieve the degree of protection required. Other protective coating, in lieu of MIL-DTL-83488, may be used if demonstrated to be satisfactory and approved by the preparing activity. Cadmium plating must be avoided when satisfactory alternative processes can be used.

3.16 Indexing dowel pins. When pushed through the mounting flange, the two indexing dowel pins provided for aligning the unit shall not impose any adverse effects on the performance of the unit as required by this specification.

3.17 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.18 Workmanship. The transmitter shall be constructed and furnished in a thoroughly workmanlike manner, using MIL-HDBK-454 as guidance. Particular attention shall be given to neatness and thoroughness of soldering, wiring, marking of parts and assemblies, plating, painting, riveting, machine screw assemblies, welding, brazing, and freedom of parts from burrs and sharp edges.

3.18.1 Dimensions. Dimensions and tolerances not specified shall be as close as is consistent with the best shop practices. Where dimensions and tolerances affect the interchangeability, operation, or performance of the transmitter, they shall be held or limited accordingly.

3.18.2 Riveting. Riveting operations shall be carefully performed to insure that the rivets are tight and satisfactorily headed.

3.18.3 Cleaning. The transmitter shall be thoroughly cleaned of loose, spattered, or excess solder, metal chips, or other foreign material after assembly. Burrs and sharp edges as well as resin flash which might crumble shall be removed.

3.18.4 Screw assemblies. Assembly screws and bolts shall be tight. The word tight means that the screw or bolt cannot be appreciably tightened further without damage or injury to the screw, bolt, or threads.

3.18.5 Gears. Gear assemblies shall be properly aligned, meshed, and shall be operable without interference, tight spots, loose spots, or other irregularities. Where required for accurate adjustments, gear assemblies shall be free from backlash.

3.19 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased 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.

4. VERIFICATION

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

- a. First article inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.2.

4.2.1 Standard atmospheric conditions. Whenever the pressure and temperature existing at the time of the inspection are not specified definitely, it is understood that the time of the inspection is made at atmospheric pressure (approximately 29.92 inches Hg) and at room temperature (approximately 25 degrees C). When inspections are made with atmospheric pressure and room temperature differing materially from the above values, proper allowances shall be made for the difference from the special conditions.

4.2.2 Tapping. Unless otherwise specified, the transmitter shall be tapped or vibrated before an inspection reading is taken.

4.2.3 Test position. Unless otherwise specified, the transmitter shall be tested with the sensing element and the electrical connector in a horizontal or vertical plane.

4.2.4 Connection. Unless otherwise specified, the transmitter shall be suitably connected to a standard test indicator and a power supply.

4.2.5 Standard test indicator. Facilities for determining the rotor position of the follow-up synchro to within ± 0.1 degrees shall be provided. The servo system shall not introduce more than 0.1 degrees error in the indication. The single-phase winding of the transmitter synchro shall be excited with 26V 400 Hz and the error signal for the amplifier shall be obtained from the single-phase winding of the follow-up synchro. The indicator shall be set to indicate 0 degrees when connected to the transmitter at electrical zero. For inspections where a transient condition is to be recorded, an oscillograph may be substituted for the indicator. When approved by the procuring activity, other methods to determine electrical zero, rotation, and scale error may be used.

4.2.6 Determination of electrical zero.

4.2.6.1 Synchro transmitter electrical zero. The following procedures shall be used to determine electrical zero for the synchro transmitter:

- a. Label the rotor leads H and C as specified in 3.8.
- b. Select the Z stator lead (pin D) and connect it to the C rotor lead.
- c. Apply 26V 400 Hz power to rotor leads H and C as specified in 3.8. Connect a VTVM between the remaining stator leads and rotate the rotor or stator until a NULL or minimum voltage is obtained.
- d. Measure the voltage between the H lead and the remaining stator leads. If this voltage is less than the excitation voltage of the rotor, the synchro is at LOW NULL. If the voltage is greater than the rotor excitation voltage, the synchro is at HIGH NULL.
- e. Turn the synchro to a low null position, connect a VTVM across one of the remaining stator leads and pin A (ground) with the second lead open. When the vane is turned clockwise, the voltage will increase before decreasing if the X stator lead is connected. The voltage will decrease before increasing if the Y stator lead is connected. All the leads of the synchro shall be labeled in accordance with the above inspections.
- f. The pin connections specified in 3.8 and direction of increasing function (counter-clockwise) applies to a left-hand installation only.

4.3 First article inspection.

4.3.1 Test samples. The test samples shall consist of three transmitters representative of the production equipment. The samples shall be identified with the manufacturer's part number and such other information as required by procuring activity.

4.3.2 First article inspections. The first article inspections shall consist of all the inspections described under 4.5.

4.4 Conformance inspections. Conformance inspections shall consist of:

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

4.4.1 Individual tests. Each transmitter shall be subjected to the following tests as described under 4.5:

- a. Examination of product
- b. Electrical zero and rotation
- c. Aerodynamic alignment
- d. Scale error at room temperature

4.4.2 Sampling plans and tests.

4.4.2.1 Sampling plan A. One transmitter shall be selected at random from each 100 or less produced on the contract or order and subjected to the following tests as described under 4.5:

- a. Individual tests
- b. Low temperature operation
- c. High temperature operation
- d. Vibration
- e. Heating element endurance

4.4.2.2 Sampling plan B. Unless otherwise specified, 3 transmitters shall be selected at random from the first 15 items of the contract or order and subjected to the following tests as described under 4.5:

- a. Sampling plan A tests
- b. Heating element operation
- c. Damping and time constant
- d. Low temperature exposure
- e. High temperature exposure
- f. Rain
- g. Humidity
- h. Sand and dust
- i. Fungus
- j. Salt spray
- k. Endurance
- l. Radio noise suppression
- m. Acceleration
- n. Oscillatory acceleration

4.4.2.3 Rejection and retest. When one item selected from a production run fails to meet the specification, no items still on hand or later produced shall be accepted until the extent and cause of failure are determined. After corrections have been made, all necessary tests shall be repeated.

4.4.2.3.1 Individual test may continue. For operational reasons, individual tests may be continued pending the investigation of a sampling test failure, but final acceptance of items on hand or later produced shall not be made until it is determined that items meet all the requirements of the specification.

4.4.2.4 Defects in items already accepted. The investigation of a test failure could indicate that defects may exist in items already accepted. If so, the contractor shall fully advise the procuring activity of all defects likely to be found and methods of correcting them.

4.5 Test methods.

4.5.1 Examination of product. The transmitter shall be inspected to determine compliance with the requirements specified herein with respect to dimensions, materials, workmanship, and marking.

4.5.2 Electrical zero and rotation. The transmitter shall be connected as specified in 4.2.4 and 4.2.5. When the sensing element is set to the center position (zero degree with respect to a perpendicular to the centerline through two dowel pins), the pointer on the rest indicator shall indicate 0 degrees $\pm$ 0.2 degrees as read on the test indicator. When the sensing element is rotated in the direction of increasing positive function, the pointer of the test indicator shall rotate clockwise. When the sensing element is rotated in the direction of decreasing positive function, the pointer of the test indicator shall rotate counterclockwise.

4.5.3 Aerodynamic alignment. The transmitter shall be mounted on alignment pins in a suitable wind tunnel and connected as specified in 4.5.2. The airspeed in the working section of the wind tunnel shall be adjusted to 110 ± 5 knots. The test indicator shall indicate zero within the tolerances specified in table II. The sensing element shall then be displaced various amounts from 0.3 degrees to 30 degrees, inclusive, in both directions. After being released without impulse, the sensing element shall return to zero within the same specified tolerances. With prior approval by the contracting officer, this test may be simulated by the use of a suitable jig and springs to simulate the aerodynamic forces of the wind tunnel. As an alternate method, the following test procedure may be used. Install the unit in the test fixture in such a manner as to locate the alignment pins at 90 degrees to the bisector of the vane wedge. When the unit is so positioned, the synchros shall be at electrical zero ± 0.08 degrees. The transmitter shall then be rotated throughout its 60 degrees angular travel at a constant speed of 1/32 rpm. The force required to keep the vane arm from rotating shall be measured and shall not exceed 12 grams. This test may be conducted in conjunction with the scale error test.

TABLE II. Aerodynamic Alignment.

Column 1	Column 2	Column 3
Sensing Element Angle (Degree)	Test Indicator (Degree)	Test Indicator Tolerance (Degree)
-30.0	+279.00	±0.2
-25.0	+292.50	±0.2
-24.9	+292.77	±0.2
-20.0	+306.00	±0.2
-19.9	+306.27	±0.2
-15.0	+319.50	±0.2
-10.0	+333.00	±0.2
-9.9	+333.27	±0.2
-1.0	+357.30	±0.2
-0.9	+357.57	±0.2
0	0	±0.2
+0.9	+2.43	±0.2
+1.0	+2.70	±0.2
+9.9	+26.73	±0.2
+10.0	+27.00	±0.2
+15.0	+40.50	±0.2
+19.9	+53.73	±0.2
+20.9	+54.00	±0.2
+24.9	+67.23	±0.2
+25.0	+67.50	±0.2
+30.0	+81.00	±0.2

4.5.4 Scale error at room temperature. The transmitter shall be connected as specified in 4.2.4 and 4.2.5. The sensing element shall then be rotated to each position specified in table II column 1. The test indicator shall indicate as specified in table II column 2, within the tolerances of column 3. Both synchros shall be tested in this manner.

4.5.5 Low temperature operation. The transmitter shall be connected as specified in 4.2.4 and 4.2.5 and placed in a chamber in which the ambient air temperature is -54 degrees ±2 degrees C for a period of 4 hours. At the end of this period and while at the specified temperature, power shall be applied. The transmitter shall then be subjected to and shall meet the individual tests.

4.5.6 High temperature operation. The transmitter shall be connected as specified in 4.2.4 and 4.2.5 and placed in a chamber in which the ambient air temperature is 71 degrees ±2 degrees C for a period of 4 hours. At the end of this period, the temperature shall be increased to 93 degrees ±2 degrees C. The deicing heater shall then be energized for a period of 5 minutes during which the equipment shall be operating, and the sensing element shall be moved slowly from one extreme of travel to the other. At the end of this period the ambient air temperature shall be allowed to return to 71 degrees ±2 degrees C and the transmitter shall be subjected to and shall meet the individual tests.

4.5.7 Vibration. The transmitter shall be connected as specified in 4.2.4 and 4.2.5 and mounted on a suitable vibration stand with the sensing element in a horizontal position. A steady stream of air at approximately 110 ±5 knots velocity shall be directed at the sensing element along a perpendicular to a line connecting the dowel pins and horizontal with the sensing element. With the system operating the transmitter shall then be subjected to a vibration test in accordance with MIL-STD-810 Method 514.2, Category B.1, Procedure I, Curve B. The indicator reading shall not vary from that noted prior to vibration

when corrected for false errors due to the movement across the airstream. This test may be simulated by use of a suitable jig and springs that simulate the aerodynamic forces of the wind tunnel.

4.5.8 Heating element.

4.5.8.1 Endurance. The heater power consumption (steady-state maximum value of 135 W) shall not change more than 10 percent after the heating element has been subjected to a 40 cycle endurance test. Each cycle shall consist of 10 hours with power on and 2 hours with power off. 100 of the 400 hours of operation shall be run in still air at room temperature and the other 300 of operation shall be run with the probe in an airflow at room temperature with the velocity no greater than 50 knots. Any damage resulting from this test that would affect proper operation of the probe shall be cause for rejection.

4.5.8.2 Operation. The transmitter shall be mounted in an icing wind tunnel and tested at indicated airspeeds of 100 ± 5 and 350 ± 5 knots at a temperature of -30 degrees ± 5 degrees C. The liquid water content of the air flowing over the sensing elements shall be 1.00 ± 0.25 grams per cubic meter air. Rated voltage applied to the heater elements of the transmitter shall prevent formation of ice on the sensing element for a period of not less than 15 minutes while the conditions specified herein are maintained.

4.5.9 Damping and time constant. With the transmitter mounted in a wind tunnel as in the aerodynamic alignment test and with the airspeed adjusted to 110 ± 5 knots the sensing element shall be displaced 3 degrees in both directions. Upon release the sensing element shall return to 0 degrees with an overshoot no greater than 0.5 degrees. Maximum flutter about this position, discounting airstream turbulence, shall not exceed ± 0.15 degrees. This procedure shall be repeated and the time required for the sensing element displacement to be reduced to 36.7 percent of its maximum value and shall not exceed 0.075 seconds. This test may be simulated by use of suitable jig and springs to simulate the aerodynamic forces of the wind tunnel.

4.5.10 Low temperature exposure. The transmitter shall be subjected to a temperature of -64 degrees ± 2 degrees C for a period of 48 hours. The transmitter shall then be allowed to return to room temperature after which it shall be subjected to and shall meet the individual tests. No damage or deterioration shall have occurred that would affect subsequent operation.

4.5.11 High temperature exposure. The transmitter shall be subjected to a temperature of 71 degrees ± 2 degrees C for a period of 24 hours. The transmitter shall then be allowed to return to room temperature. No damage shall have occurred to any part of the transmitter that would affect subsequent operation. The transmitter shall then be subjected to and shall meet the individual tests.

4.5.12 Rain. The transmitter shall be tested in a water spray wind tunnel at an indicated airspeed of approximately 20 knots at room temperature for a period of 2 hours. Water spray equivalent to a heavy rain (0.80 inch per hour) shall be introduced into the wind stream. Only the sensing element shall be exposed to the wind stream, the remainder of the transmitter shall be enclosed to simulate installed conditions. The sensing element shall be horizontal and facing upstream. After the 2-hour exposure to the wind stream containing the water spray, the inside of the transmitter shall be examined and no moisture shall be present.

4.5.13 Environmental tests. The following tests shall be conducted in accordance with the applicable procedures of MIL-STD-810 as specified herein.

4.5.13.1 Humidity. The humidity test shall be conducted in accordance with Method 507.1, Procedure I, except for the test period shall be for a period of 15 cycles. During the test period, the transmitter connector contacts shall be protected. At the conclusion of the test, the inside of the transmitter shall be examined and no moisture shall be present.

4.5.13.2 Dust (Fine sand). The sand and dust test shall be conducted in accordance with Method 510.1, Procedure I except the test period shall be 12 hours, and a stream of sand, which would pass through a 150-mesh screen, having a velocity of approximately 20 knots shall be directed at the front of the sensing element. The body of the transmitter shall be protected from the airstream. At the end of the 12-hour test period, the transmitter shall meet all the individual tests.

4.5.13.3 Fungus. The fungus test shall be conducted in accordance with procedure I. At the conclusion of the test, the transmitter shall meet and pass the individual tests. There shall be no deterioration which would adversely affect subsequent operation nor shall any part of the transmitter support fungus growth.

4.5.13.4 Salt fog. The salt fog test shall be conducted in accordance with Method 509.1, Procedure I as specified for a period of 50 hours. No damage shall result from this test which would affect subsequent operation. Following this test, the transmitter shall be subjected to and shall meet the individual tests.

4.5.14 Endurance. The sensing element of the transmitter shall be oscillated throughout the range of travel for 30,000 cycles. At the conclusion of this test, the transmitter shall be subjected to and shall meet the individual test.

4.5.15 Radio noise. The transmitter shall meet the radio noise suppression tests specified in MIL-STD-461 within the frequency range of 150 kHz to 150 MHz.

4.5.16 Acceleration. The transmitter shall be subjected to an acceleration of 10g in the vertical and transverse directions without failure. The transmitter shall be capable of operating when subjected to an acceleration of 5g in the vertical and transverse directions with a maximum degradation in dynamic accuracy of ± 0.1 degrees. The scale error shall be determined at a simulated airspeed of 300 ± 10 knots.

4.5.17 Oscillatory acceleration. The mounting and air velocity for this test shall be as specified in 4.5.7. The transmitter shall be oscillated at a frequency of 2 Hz and accelerated at a rate of 0.5g for a minimum period of 10 minutes. During the test, the vane shall remain aligned with the airstream. Degradation in dynamic accuracy shall not exceed ± 0.2 degrees.

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 transmitter covered by this specification is intended for use in aircraft as a means of determining the angle of airflow at the point of installation of the transmitter (local angle of attack or sideslip) and to transmit electrical signals to indicators or other equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. When sampling plan B tests will not be conducted
- c. Packaging requirements

6.3 Tin whisker growth (see [3.3.6](#)). 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).

6.4 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. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the EPA 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 [3](#)).

6.5 Subject term (key word) listing.

Aerodynamic alignment
Oscillatory acceleration
Radio noise suppression

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:
DLA - CC
Air Force - 85

Preparing activity:
DLA - CC

(Project 6610-2015-007)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil/>.