

MIL-T-5583C

27 November 1987

SUPERSEDING

MIL-T-5583B

24 September 1963

## MILITARY SPECIFICATION

## TRANSMITTER, POSITION, 28 VOLTS DC

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

## 1. SCOPE

1.1 Scope. This specification covers certain design and all performance requirements for the procurement of position transmitters for operation on 28-volts direct current.

1.2 Classification. The transmitter shall be of the following classes, as specified in 6.2.

- (a) Class 1 - Geared 2:1 ratio as shown in Drawing AN5786.
- (b) Class 2 - Nong geared 1:1 ratio as shown in Drawing AN5787.
- (c) Class 3 - Transmitter elements built into actuator units as shown in figure 3.

## 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.

SPECIFICATIONSFEDERAL

PPP-B-601	Boxes, Wood, Cleated Plywood
PPP-B-636	Box, Shipping, Fiberboard
QQ-C-320	Chromium Plating (Electrodeposited)
QQ-N-290	Nickel Plating (Electrodeposited)

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MIL-P-116	Preservation, Method Of
DOD-D-1000	Drawing, Engineering And Associated List
MIL-M-3171	Magnesium Alloy, Processes For Corrosion Protection Of
MIL-C-5015	Connectors, Electric, "AN" Type

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/MMEDO, Tinker AFB OK 73145-5990 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

FSC 6610

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MIL-C-5541	Chemical Films For Aluminum And Aluminum Alloys
MIL-L-6085	Lubricating Oil; Aircraft Instrument, Low Volatility
MIL-S-7742	Screw Threads; Standard, Optimum Selected Series. General Specification For
MIL-A-8625	Anodic Coatings; For Aluminum and Aluminum Alloys
MIL-C-83488	Coating, Aluminum, ION Vapor Deposited

STANDARDSFEDERAL

FED-STD-595	Color
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MILITARY

MIL-STD-129	Marking For Shipment And Storage
MIL-STD-130	Identification Marking Of U.S. Military Property
MIL-STD-454	Standard General Requirements For Electronic Equipment
MIL-STD-704	Aircraft Electric Power Characteristics
MIL-STD-810C	Environmental Test Methods And Engineering Guidelines
MIL-STD-889	Dissimilar Metals
DOD-STD-1866	Soldering Process General (Non-electrical)
MIL-STD-2073-1	DOD Material Procedures For Development And Application Of Packaging Requirements
MS3102	Connector, Receptacle, Electric, Box Mounting
MS33540	Safety Wiring And Cotter Pinning, General Practices For
MS33678	Connector, Receptacle, Electric, Integral Mounting
AN5786	Transmitter & Position, 28 Volts DC
AN5787	Transmitter & Position, Gearless

(Copies of specifications and standards 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 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which is current on the date of the solicitation.

American Society For Testing and Materials (ASTM)

ASTM B633	Zinc On Iron & Steel, Electrodeposited Coatings Of
ASTM D3951	Packaging, Commercial

(Application for copies should be addressed to: ASTM, 1916 Race St, Philadelphia PA 19103.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

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2.3 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, AN 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.

### 3. REQUIREMENTS

3.1 Qualification. The transmitter furnished under this specification shall be a product which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.4).

3.2 Selection of government documents. Specifications and Standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143 except as provided in 3.2.1 and 3.2.2.

3.2.1 Commercial parts. Commercial parts having suitable properties may be used where, on the date of invitation for bids, there are no suitable standard parts. In any case, commercial utility parts, like screws, bolts, nuts, cotter pins, having suitable properties, may be used provided:

- (a) They can be replaced by the standard parts (MS or AN) without alteration.
- (b) The corresponding standard part numbers are referenced in the parts list and if practicable, on the contractor's drawings.

3.2.2 Standard parts. With the exception of 3.2.1, MS and AN standard parts shall be used where they suit the purpose. They shall be identified on the drawings by their part numbers.

3.3 Materials. Materials shall conform to applicable specifications and shall be as specified herein. Materials which do not conform to applicable specifications, or which are not specifically described herein, shall be of the best quality, of the lightest practicable weight and suitable for the purpose intended.

3.3.1 Critical materials. Noncritical materials shall be used where practicable. Where the use of a critical material is essential to meet specification requirements, the material used shall be the least critical of those which are adequate for the purpose.

3.3.2 Metals. Metals shall be of the corrosion-resistant type, or shall be suitably protected as specified herein to resist corrosion due to fuels, salt spray or atmospheric conditions to which the instrument may be subjected when in storage or during normal service life.

3.3.2.1 Dissimilar metals. Dissimilar metals as defined in MIL-STD-889 shall not be used in intimate contact with each other, unless suitably protected against electrolytic corrosion by means of protective coatings.

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

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3.3.4 Fungus-proof materials. Materials which are nutrients for fungi shall not be used where it is practicable to avoid them. Where used and not hermetically sealed, they shall be treated with a fungicidal agent acceptable to the contracting activity.

3.3.5 Corrosive fumes. Materials used in the interior construction of the instrument shall not produce corrosive or deleterious fumes.

3.4 Design and construction. The transmitter shall conform to Drawing AN5786 for the 2:1 ratio geared transmitter and to Drawing AN5787 for the gearless transmitter.

(a) The class 1 transmitter shall be designed to provide 180 degrees travel of the brushes for each 90 degree shaft rotation. Gearing used shall be either precision cut or of the anti-backlash type. Classes 2 and 3 transmitters shall provide 1 degree of brush travel per degree shaft rotation. The shaft shall be free to rotate through an angle of 360 degrees or more.

(b) Pivots, bearings, and gears shall neither bind nor shake, and shall be as near frictionless as practicable.

(c) The transmitter shall be so constructed that no parts will work loose in service and shall be built to withstand the strains, jars, vibration, and other conditions incident to shipping, storage, installation, and service, without failure.

3.4.1 Maintenance. The design shall be reasonably simple to facilitate as much as possible disassembly, repair or overhaul, service maintenance, and reassembly by these tools and items of maintenance equipment which are normally available as commercial standards without requiring special tools or fixtures.

3.4.2 Case. The transmitter case shall be made of non-ferrous, low density metal, uniform in texture with a smooth surface and shall be rain and dust tight. There shall be no recesses in the exterior of the assembled transmitter case which will permit water to accumulate around any hole that leads to the interior. The case shall be finished with a lusterless black finish, Color No. 37038 of FED-STD No. 595. The finish material shall be of a durable type to withstand usage encountered in service.

3.4.3 Weight. The weight of the completely assembled class 1 transmitter, without mounting nuts or screws, shall not exceed 0.50 pounds. The weight of the class 2 transmitter shall not exceed 0.30 pounds.

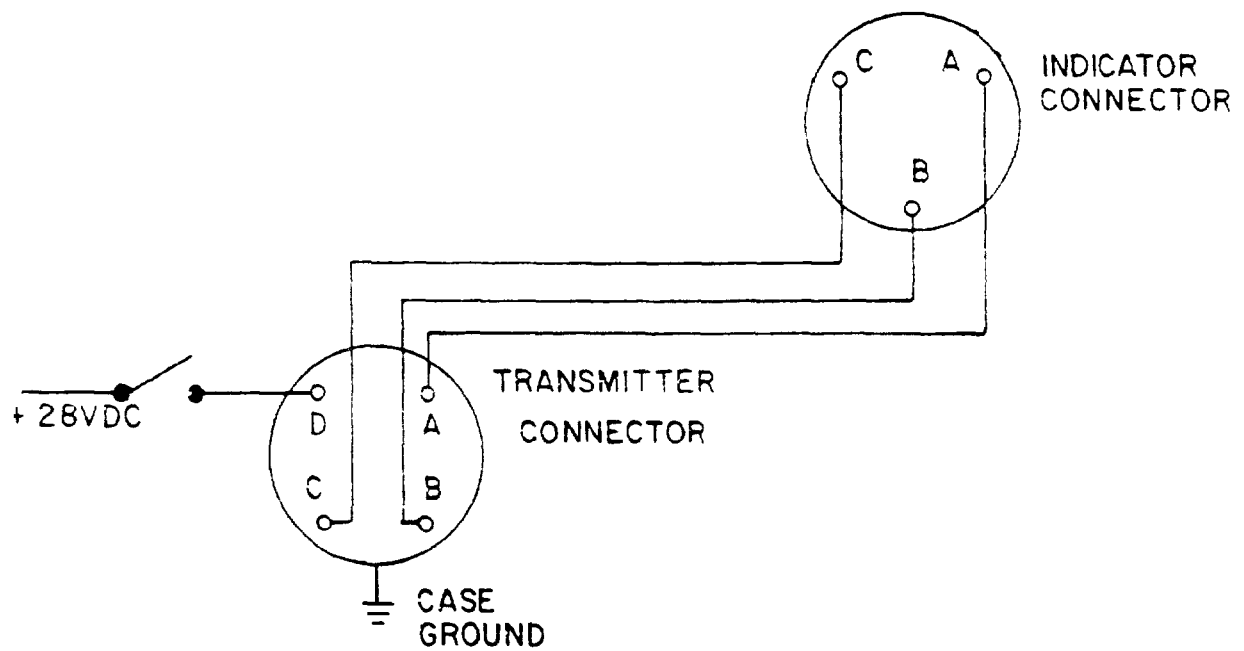
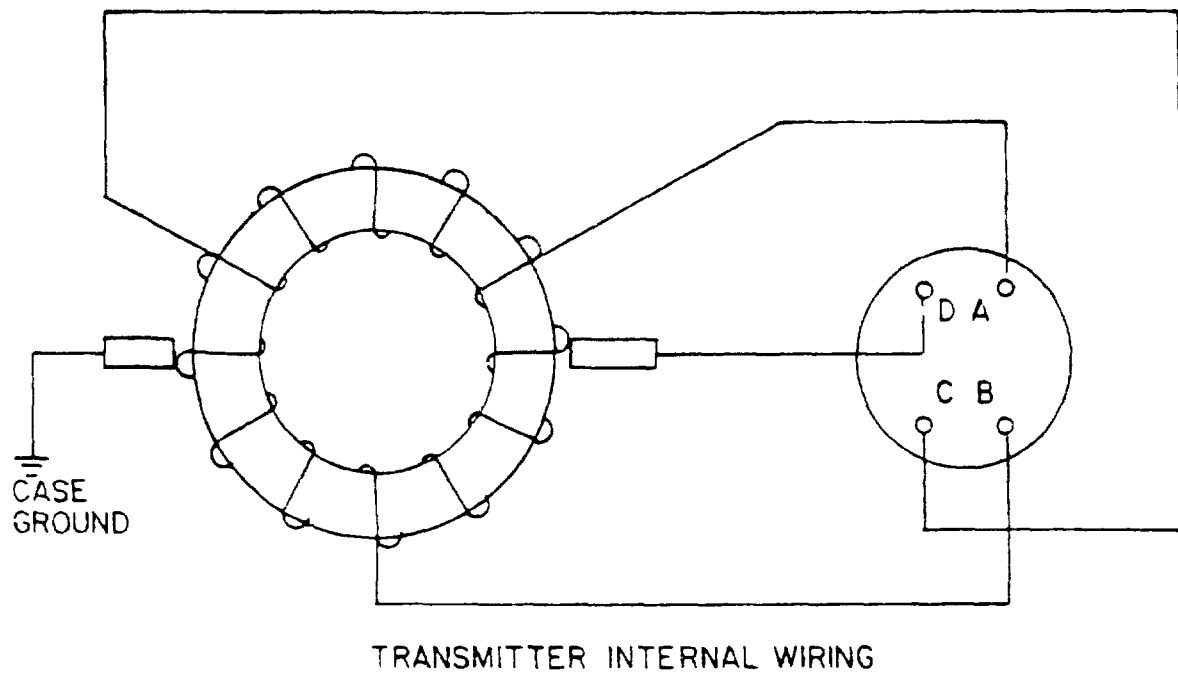
### 3.5 Electrical.

3.5.1 Power requirements. The position transmitter shall be designed to operate on 28 volts direct current in accordance with the characteristics in MIL-STD-704.

3.5.2 Wiring. The wiring shall conform to Figure 1. The internal wiring to the electrical receptacle shall be of flexible, stranded wire. The transmitter shall be so wired that clockwise rotation of the shaft, as viewed from the shaft end, shall move the brushes from tap A to tap B to tap C, etc.

3.5.3 Operation. The transmitter shall be designed for either clockwise or counterclockwise operation. For clockwise indicator pointer travel, with clockwise transmitter shaft rotation as viewed from the shaft end, the external

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FIGURE 1 External wiring diagram.

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wiring shall be as shown in Figure 1. For reverse operation, leads A and C shall be interchanged.

**3.5.4 Resistance.** The direct current resistances of the transmitter, measured between the connector pins A, B, and C shall be 600 ohms  $\pm 150$  ohms. Deviation from the average of the resistance values between the three coil sections shall not exceed  $\pm 1$  percent.

**3.5.4.1 Resistance winding.** The resistance windings shall be coated with a suitable cement, except at the line of contact, to prevent displacement of the winding. The contact surface of the winding shall be smooth and free of surface irregularities.

**3.5.5 Electrical connector.** The transmitter shall be provided with a 14S-2P four-pin integral mounting receptacle conforming to MS33678 and Specification MIL-C-5015. Wherever conditions do not warrant use of an integral mounting receptacle, the transmitter shall be provided with a 14S-2P four-pin box mounting receptacle conforming to Drawing MS3102 and Specification MIL-C-5015, except the mounting screws shall be safety wired.

**3.6 Performance.** The transmitter shall perform satisfactorily when subjected to the tests specified in Section 4 of this specification.

### **3.7 Physical requirements.**

**3.7.1 Finish.** Protective coatings and finishes which will crack, chip or scale during normal service life or due to extremes of atmospheric conditions shall not be used.

**3.7.2 Magnesium alloy parts.** Magnesium alloy parts shall be treated in accordance with Specification MIL-M-3171. When abrasion resistance is a factor, an anodic treatment approved by the contracting activity shall be used.

**3.7.3 Aluminum alloy parts.** Where practicable, aluminum alloy parts shall be covered with an anodic film conforming to Specification MIL-A-8625 except that small holes, pipe threads and case inserts need not be anodized. Aluminum alloys which do not anodize satisfactorily shall be coated with chemical film in accordance with Specification MIL-C-5541.

**3.7.4 Iron and steel parts.** Where practicable, iron and steel parts, except stainless steel, shall be nickel, chromium or zinc plated in accordance with specifications QQ-N-290, QQ-C-320 and ASTM B633 respectively.

**3.7.4.1 Steel parts.** Steel parts in a confined space in the presence of organic material, or as an option to the above platings, may be coated with ion vapor deposited aluminum, where practicable, in accordance with MIL-C-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-C-83488, may be used if demonstrated to be satisfactory and approved by the cognizant engineering activity. Cadmium plating must be avoided when satisfactory alternative processes can be used.

**3.7.5 Screw threads.** Screw threads 0.060 inch or larger in diameter shall be in accordance with Specification MIL-S-7742.

**3.7.6 Soldering.** Soldering shall be performed in accordance with Standard

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DOD-STD-1866 for non-electrical soldering and requirements 5 of Standard MIL-STD-454 for electrical soldering.

3.7.7 Lubrication. Lubricating oil shall be in accordance with Specification MIL-L-6085. Lubrication shall be sufficient for approximately 1,000 hours of use.

3.7.8 Safety wiring. All external screws shall be secured by lock-wiring in accordance with MS33540 or by equivalent method of position retention.

3.7.9 Workmanship. Workmanship of the instrument shall be in accordance with requirement 9 of Standard MIL-STD-454.

3.7.10 Gears. Gear assemblies shall be properly aligned and 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.

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

3.8 Identification of the product.

3.8.1 Nameplate. A nameplate shall be securely attached to the exterior of the case and shall be durably marked to withstand usage encountered in service. The nameplate shall be legibly marked in accordance with MIL-STD-130.

3.8.2 Manufacturer's part number. The manufacturer's part number on the nameplate shall be identical with the manufacturer's engineering production drawing number including applicable dash numbers if the drawing is tabulated and covers more than one part.

3.8.3 Interchangeability. All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufacturer's part number shall be governed by the drawing number requirements of Specification DOD-D-1000.

3.8.4 Use of military designations. Military designations shall not be applied to a product, except for Qualification Test Samples, nor referred to in correspondence or sales matter, until notification has been received from the activity responsible for qualification.

3.9 Installation.

3.9.1 Mounting screws. The contractor shall furnish sufficient mounting screws for installing the instrument. They shall be No. 6-32 roundhead brass machine screws, having durable dull black finish.

3.9.2 Mounting nuts. The transmitters shall be furnished with No. 6-32, NC-2B thread self-locking insert nuts fitted to the mounting lugs.

3.9.3 Installation instructions. The contractor shall furnish with each instrument one copy of the installation instructions with illustrations and diagrams. Prior to printing, two copies shall be furnished to the contracting activity for approval. Whenever possible the instructions shall be arranged to



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require only one sheet of paper, either 8 1/2 x 11 or 11 x 17 inches.

**3.9.4 Envelope.** An envelope furnished by the contractor, containing installation instructions and mounting screws shall be packaged with each instrument and shall be marked with the following information:

IMPORTANT  
THIS ENVELOPE CONTAINS  
INSTALLATION INSTRUCTIONS  
AND MOUNTING SCREWS

**3.10 Recycled and reclaimed materials.** Recycled and reclaimed materials shall be used to the maximum extent possible without jeopardizing the end use of the item.

#### 4. 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 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 must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

**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 Qualification inspection.** The qualification inspection of the transmitter shall consist of all the tests specified under 4.6.

**4.3.1 Qualification inspection instructions.** Qualification test samples shall consist of three transmitters, of each AM manufacturer's part number (6.2) to be furnished in accordance with this specification. The instruments submitted for testing shall not have been previously tested except for the Individual Tests. The samples shall be forwarded to the testing laboratory designated in the letter of authorization.

**4.3.2 Test sample identification.** The test samples shall be plainly identified by securely attached, durable tags marked with the information listed below:



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## Sample for Qualification Testing

Position Transmitter, 28 Volt DC

Submitted by (manufacturer's name, date) for Qualification Testing in accordance with Specification MIL-T-5583 under authorization (reference letter authorizing tests).

AN \_\_\_\_\_ (add proper dash number)

Class Number \_\_\_\_\_

Manufacturer's Part Number \_\_\_\_\_

4.4 Quality conformance inspection. The quality conformance inspection of the instruments shall consist of the Individual Tests and the Sampling Plans of this specification. The contractor shall furnish all samples and shall be responsible for accomplishing the required tests. Acceptance or approval of material during the course of manufacture shall in no case be construed as a guarantee of the acceptance of the finished product.

4.4.1 Individual tests. The individual tests shall consist of the tests listed below and as described in 4.6, conducted in the order given, on each instrument.

- (a) Examination of the product (4.6.1)
- (b) Torque test (4.6.2)
- (c) Operation test (4.6.3)
- (d) Scale error at room temperature test (4.6.4)
- (e) Voltage variation test (4.6.5)
- (f) Insulation test (4.6.6)

4.4.2 Sampling plans and tests.

4.4.2.1 Sampling plan A. Samples shall consist of three position transmitters selected at random from each lot of 100 or less which have passed the Individual Tests. A lot shall consist of identical instruments with the same manufacturer's part number, manufactured under substantially the same conditions and submitted at substantially the same time. Instruments which have been subjected to the sampling plan A tests (4.4.2.1.1) shall not be delivered on contract until they have been reconditioned and resubmitted to all Individual Tests.

4.4.2.1.1 Sampling plan A tests. The sampling plan A tests shall consist of the tests listed below and as described in 4.6, conducted in the order given, on each sample.

- (a) Magnetic effect test (4.6.7)
- (b) Torque and scale error at low temperature test (4.6.8)
- (c) Scale error at high temperature test (4.6.9)
- (d) Vibration error test (4.6.10)
- (e) High altitude - low temperature test (4.6.11)
- (f) High temperature exposure test (4.6.12)

4.4.2.2 Sampling plan B. Unless otherwise specified, the samples shall consist of three position transmitters selected at random from the first 15 instruments produced on contract within 10 days after manufacture. The samples shall be forwarded to the laboratory specified herein (6.2) and shall be plainly identified by securely attached, durable tags marked with the following information.

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Position Transmitter, 28 Volt DC

Submitted by (Manufacturer's name, date) for production acceptance testing in accordance with Contract/Order No. \_\_\_\_\_.

4.4.2.2.1 Sampling plan B tests. The sampling plan B tests shall consist of those tests listed below and as described in 4.6, conducted in the order given, on each sample.

- (a) Sampling plan A tests (4.4.2.1.1)
- (b) Vibration endurance test (4.6.13)
- (c) Transmitter life test (4.6.14)

4.4.3 Rejection and retest. When 1 or more items from a lot fail to meet the sampling plan A tests (4.4.2.1.1) or sampling plan B tests (4.4.2.2.1), acceptance of all items in the lot will be withheld until the extent and cause of failure are determined. The instructions on reworking, refurbishing, or resubmitting rejected items shall be as specified in the General Provision of the contract or order. After corrections have been made, all necessary tests shall be repeated.

4.5 Inspection conditions. Unless otherwise specified all inspections shall be performed in accordance with the test condition specified in 4.5.1 of this specification.

4.5.1 Standard atmosphere conditions. Whenever the pressure and temperature existing at the time of the test are not specified definitely, it is understood that the test is to be made at atmospheric pressure (approximately 29.92 inches hg) and at room temperature (approximately plus 25°C). When tests are made with atmospheric pressure or room temperature differing materially from the above values, proper allowance shall be made for the difference from the specified condition.

4.5.2 Test indicator. When a test indicator is specified in the tests, it shall be a three-coil, three-wire position indicator whose scale errors are known in terms of the average production of the manufacturer. The indicator scale shall be marked in 360 mechanical degrees (standard calibrating dial). The internal wiring of such an indicator is shown in Figure 2. Readings obtained shall be corrected for scale errors of the test indicator.

4.6 Test methods.

4.6.1 Examination of product. Each transmitter shall be examined to determine conformance with this specification with respect to materials, design and construction, workmanship, markings and envelope.

4.6.2 Torque test. The torque required to turn the transmitter shaft shall be determined for clockwise and counterclockwise rotation. The torque required shall not exceed 0.50 inch-pound.

4.6.3 Operation test. The transmitter shall be connected to a test indicator and a 28V dc source as shown in Figure 1. The indicator pointer shall move smoothly and uniformly throughout its range of travel as the transmitter shaft is rotated.

4.6.4 Scale error at room temperature test. The transmitter shaft shall be so rotated that the indicator pointer is at the zero position. For the class 1 item, the shaft shall be rotated in 30 degree increments to 180 degrees and return, the class 2 transmitters shall be tested at 60 degree increments. The indication

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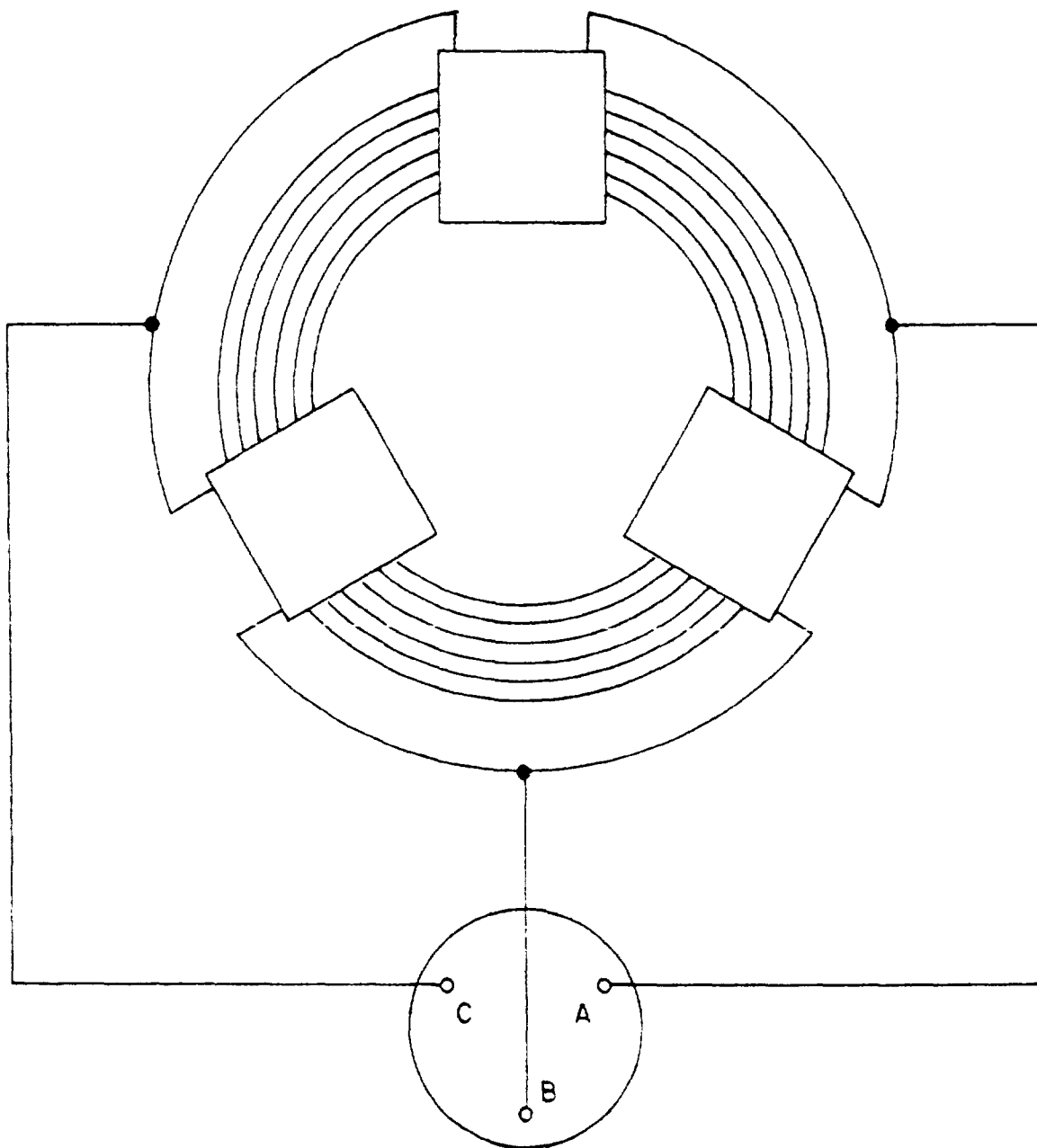


FIGURE 2. Internal wiring test indicator.



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shall be noted at each 60 degree graduation from 0 to 360, and return from 360 to 0. The error shall not exceed  $\pm 2$  degrees.

4.6.5 Voltage variation test. The voltage applied to the transmitter shall be reduced to 22.500 V with the indicator pointer at the 45 degree indication. The voltage shall then be increased to 30V. The change in indication shall not exceed 2 degrees.

4.6.6 Insulation test. A potential of 500 volts root-mean-square (rms) alternating current at commercial frequency shall be applied between isolated pins and between pins and case for 5 seconds. There shall be no breakdown of insulation or other permanent damage to the instrument as a result of this test.

4.6.7 Magnetic effect test. The transmitter shall be held in various positions with its nearest part 5 inches from and magnetically east or west of the center of a short bar magnet compass. The horizontal magnetic field intensity shall be 0.17 to 0.19 oersted. The compass shall be observed for change in deflection, which shall not exceed 3 degrees.

4.6.8 Torque and scale error at low temperature test. The transmitter and the test indicator shall be connected as shown in Figure 1. The transmitter only shall be placed in a chamber, the temperature of which is controllable. The temperature of the circulating air shall be reduced to  $\text{minus } 55^{\circ} \pm 2^{\circ}\text{C}$ , and held at this temperature for the duration of the test. Voltage may be applied to the transmitter after it has reached the temperature of  $\text{minus } 55^{\circ} \pm 2^{\circ}\text{C}$  for not less than 1 hour. The torque required to turn the transmitter shaft at this temperature shall not exceed 5 inch-pounds. The torque and scale error at low temperature test shall be conducted with the transmitter at the specified temperature in the chamber. The scale error at the low temperature shall not exceed 4 degrees.

4.6.9 Scale error at high temperature test. The scale error shall be determined as specified in the 4.6.8 test, except that the temperature shall be  $70^{\circ} \pm 2^{\circ}\text{C}$ . The scale error shall not exceed 4 degrees.

4.6.10 Vibration error test. The transmitter shall be operated to produce any indication between 30 degrees and 60 degrees and subjected to vibration at an amplitude of 0.018 and 0.020 inch, as specified in 4.5.2. The indication shall be determined without vibration and as the vibration frequency is varied uniformly from 500 to 3,000 cycles per minute. Vibration of the transmitter shall not produce a pointer oscillation amplitude exceeding 2 degrees indication. The change in indication caused by vibration shall not exceed 2 indicated degrees.

4.6.11 High altitude-low temperature test. The transmitter shall be placed in a chamber, maintained at a temperature of  $\text{minus } 65^{\circ} \pm 2^{\circ}\text{C}$ , and subjected to a pressure altitude condition of 50,000 feet (3.44 inches Hg absolute pressure) for a period of 4 hours. Following this period, the transmitter shall be maintained at  $\text{minus } 65^{\circ} \pm 2^{\circ}$  at standard atmospheric pressure for 44 hours. While at this temperature, the transmitter shall be operated throughout its range without exhibiting sticking or erratic characteristics. The temperature shall then be raised to  $\text{minus } 54^{\circ} \pm 2^{\circ}\text{C}$  for a period of 24 hours, and the transmitter shall meet the requirements specified in 4.6.8.

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4.6.12 High temperature exposure test. The transmitter shall be tested in accordance with Procedure I of Standard MIL-STD-810C method 514.2 except that the time period the transmitter is held at the high temperature shall be 24 hours. At the end of the period and while still at the high temperature, the equipment shall operate without indication of sticking or erratic action. After the chamber has been returned to room temperature and the equipment has saturated at room temperature for a minimum period of 4 hours, it shall meet the individual test requirements specified herein.

4.6.13 Vibration test. Prior to this test the transmitter shall be subjected to the 4.6.4 test and the readings recorded. The transmitter shall be connected to a suitable indicator and operated to produce an indication between 30 and 60 degrees. The transmitter shall then be tested in accordance with Procedure I of Standard MIL-STD-810C Method 501.1 for category b.1 equipment using Curve D. During vibration cycling, the transmitter shall not produce an indicator pointer oscillation with an amplitude greater than 2 degrees. Following completion of the vibration testing, the transmitter shall again be subjected to the 4.6.4 test. Any changes in indication shall not exceed the initial reading by more than 2 degrees at any test point. The transmitter shall then also be subjected to and meet the requirements of the 4.6.8 test.

4.6.14 Transmitter life test. The transmitter shall be operated for 200,000 cycles, in which the brushes travel over the resistance winding approximately 10 degrees on each side of the point where one of the taps is located. The 200,000 cycles of oscillation shall be at the rate of approximately 1200 cycles per minute. Upon completion of the cycling the transmitter shall be placed shaft upward in a bell jar. Water shall be placed on the horizontal surface around the operating shaft. When all the water the surface will hold has been added, the pressure inside the ball jar shall be reduced to and held at approximately 4 inches of mercury absolute for 5 minutes and then in 30 seconds returned to and held at ambient pressure for 5 minutes. This cycle shall be performed a total of 5 times. The transmitter shall then be wiped dry, opened and examined. Any evidence of excessive wear or of water inside the case shall be cause for rejection.

4.6.15 Salt fog. The transmitter shall be tested in accordance with Procedure I of Standard MIL-STD-810C method 509.1 except that the time of the test shall be reduced to 50 hours. After the testing procedure, the transmitter shall be subjected to and meet the requirements of the Individual Tests.

4.6.16 Dust (fine sand). The transmitter shall be tested in accordance with Procedure I of Standard MIL-STD-810C method 510.1.

4.6.17 Humidity test. The transmitter shall be tested in accordance with Procedure I of Standard MIL-STD-810C method 507.1 for a time period of 240 hours (or 10 cycles). Prior to the humidity cycling, the transmitter shall be subjected to the 4.6.4 test. Upon completion of the cycling period, the 4.6.4 test shall be conducted again. The change in indication shall not exceed the initial readings by more than 2 degrees at any test point.

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4.6.18 Fungus resistance test. The transmitter shall be tested in accordance with Procedure I of Standard MIL-STD-810C method 508.1, except that the test period, the transmitter shall be carefully examined to ascertain that no fungus growth has occurred.

4.6.19 Mounting nut test. Each attached mounting nut of the completely assembled transmitter case shall have an axial load of 25 pounds so applied as to tend to pull the nut out of the lug toward the rear of the case. There shall be no loosening of the nut. A torque of 10 pound-inches shall then be applied, and the rotation of the nut shall be limited by contact between a flat of the insert nut and the case.

4.6.20 Mounting lug test. The transmitter case, with the mechanism removed, shall be mounted in a suitable testing machine with the diameter of the case in a horizontal plane to insure that the mounting lugs receive no added support. A suitable pin shall be inserted through the hole in the mounting lug or the mounting nut and attached to a pull strap in the machine. A load of 175 pounds shall be applied to each lug for a period of 1 minute along the mounting hole axis and toward the front of the case. There shall be no fracture.

4.7 Inspection of packaging. The inspection of the packaging and interior package marking shall be in accordance with group A and B quality conformance requirements, Section 4 of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of applicable container specification and the marking requirements of MIL-STD-129.

## 5. PACKAGING

5.1 Preservation. Preservation shall be level A, C, or Industrial, IAW MIL-STD-2073-1, as specified (see 6.2).

### 5.1.1 Level A.

5.1.1.1 Cleaning. Transmitter shall be cleaned in accordance with process C-1 of MIL-P-116.

5.1.1.2 Drying. Transmitter shall be dried in accordance with process D-4 of MIL-P-116.

5.1.1.3 Preservation application. Preservative shall not be used.

5.1.1.4 Unit packaging. Unless otherwise specified by the contracting activity, each transmitter shall be packaged in quantity unit packs of one each in accordance with Method IIC of MIL-P-116. Each transmitter shall be placed in a PPP-B-636 Fiberboard container weather resistant, with sufficient cushioning material between bag and unit container of a type, density, and thickness to insure shock transmission does not exceed peak values in G's established for the transmitter when completed packs are subjected to the rough handling drop tests of MIL-P-116.



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5.1.2 Level C. Each transmitter shall be clean, dry and individually packaged in a manner that will afford adequate protection against corrosion, deterioration, and physical damage during shipment from supply source to the first receiving activity.

5.1.3 Industrial. The Industrial preservation of transmitter shall be in accordance with ASTM D3951.

5.2 Packing. Packing shall be level A, B, C, or Industrial as specified (see 6.2).

5.2.1 Level A. Transmitter packaged as specified in 5.1.1 shall be packed in shipping containers conforming to PPP-B-601, Styles A or B, Class overseas, unless otherwise specified by the contracting activity. Insofar as practical, exterior shipping container shall be of uniform shape, size, minimum tare and cube consistent with the protection required.

5.2.2 Level B. Transmitter packaged as specified in 5.1.1 shall be packed in shipping containers conforming to PPP-B-636, class weather-resistant, unless otherwise specified by the contracting activity. Other requirements as specified in 5.2.1 apply.

5.2.3 Level C. Packing shall be applied which affords adequate protection during domestic shipment from the supply source to the first receiving activity for immediate use. This level shall conform to applicable carrier rules and regulations.

5.2.4 Industrial. The packaged transmitter shall be packed in accordance with ASTM D3951.

5.3 Marking. In addition to any other markings required by the contract or order (see 6.2), interior and exterior containers shall be marked in accordance with MIL-STD-129.

## 6. NOTES

6.1 Intended use. The transmitters covered by this specification are intended for use on aircraft to transmit electrically the relative position of control surfaces in degrees to a remote indicator.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification
- (b) The quantity, AN part number and class number of the instrument desired
- (c) Whether or not Sampling Plan B is to be omitted and if not, add the name and address of the laboratory to which the samples should be submitted.
- (d) Levels of packaging (5.1) and packing (5.2) desired.

6.3 Drawing requirements. The attention of contractors is invited to the fact that government contracts for equipment, whether procured directly by the government or through another contractor, require that all drawings submitted must be in accordance with the requirements of Specification DOD-D-1000.

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6.4 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government, tested for qualification, in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is OC-ALC/MMEDO, Tinker AFB, OK 73145-5990, and information pertaining to qualification for products may be obtained from that activity.

6.5 Subject term (key word) listing.

AN5786  
AN5787  
C118  
DC  
Flaps  
Landing Gear  
Multi  
Position  
Transmitter  
OV10  
10G

6.6 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.

Custodians:  
Air Force - 99  
Navy - AS  
Army - AV

Preparing activity:  
Air Force - 71  
  
Project number:  
6610-0185

**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.

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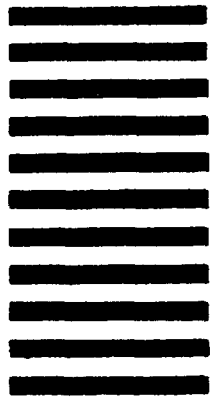
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