INCH-POUND

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20 July 2007
SUPERSEDING
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30 June 1966

DETAIL SPECIFICATION

GENERATOR, TACHOMETER, TWO-POLE, HIGH TEMPERATURE, AIRCRAFT

Inactive for new design after 14 September 1998.

This specification is approved for use by all departments and agencies of the Department of Defense.

1. SCOPE. This specification covers two-pole, alternating current; tachometer generators designated MS25038-4 for use on turboprop and turbojet engines.

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 the 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).

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center Richmond, ATTN: DSCR-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or e-mailed to STDZNMGT@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at http://assist.daps.dla.mil.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-5015	- Connectors, Electrical, Circular Threaded, AN Type, General Specification for.
MIL-DTL-5541	- Chemical Conversion Coatings on Aluminum and Aluminum Alloys.
MIL-S-7742	- Screw Threads, Standard, Optimum Selected Series: General Specification for.
MIL-PRF-7808	- Lubricating Oil, Aircraft Turbine Engine, Synthetic Base.
MIL-A-8625	- Anodic Coatings for Aluminum and Aluminum Alloys.
MIL-I-22596	- Indicator, Tachometer, Electric, 0-120 percent RPM, 2-inch Size.
MIL-P-23408	- Plating: Tin-Cadmium (Electrodeposited).
MS25038	- Generators, Tachometer and Synchronizing, Piston and Turbine Engines.
MIL-I-25623	- Indicator, Electrical Tachometer.
MIL-DTL-31000	- Technical Data Packages.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	- Identification Marking of U.S. Military Property.
MIL-STD-810	- Environmental Engineering Considerations and Laboratory Tests.
MIL-STD-889	- Dissimilar Metals.
MIL-STD-1916	- DoD Preferred Methods for Acceptance of Product.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-454	- General Guidelines for Electronic Equipment.
MIL-HDBK-781	- Reliability Test Methods, Plans, and Environments for Engineering, Development Qualification, and Production.
MIL-HDBK-831	- Preparation of Test Reports.

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

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 (see 6.2).

STANDARDIZATION DOCUMENT

SD-6	- Provisions Governing Qualification.

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

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 (see 6.2).

ASTM INTERNATIONAL

ASTM B 633	- Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
ASTM E 18	- Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.

(Copies of these documents are available online at http://www.astm.org/ or from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS-M-3171	- Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion on.
SAE AMS-QQ-N-290	- Nickel Plating (Electrodeposited).
SAE AMS-QQ-C-320	- Chromium Plating (Electrodeposited).
SAE AMS-QQ-P-416	- Plating, Cadmium (Electrodeposited).
SAE AS3491	- Gasket - Type X or XV Engine Accessory Drive.

(Copies of these documents are available online at http://www.sae.org/ or from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA

NASM33540	- Safety Wiring, Safety Cabling, Cotter Pinning, General Practices for.

(Copies of these documents are available online at http://www.aia-aerospace.org/ or from Aerospace Industries Association of America, 1250 Eye Street N.W., Suite 1200, Washington, DC 20005-3924.)

2.4 Order of precedence. 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 Qualification. Generators furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list (QPL) before contract award (see 4.3 and 6.3).

3.2 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.

3.3 Materials. Materials shall conform to applicable specifications and shall be as specified herein. Materials for which there are no 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. Non-critical 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 that are adequate for the purpose.

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

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

3.3.3.1 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.

3.3.3.2 Magnesium alloy parts. Magnesium alloy parts shall be treated in accordance with SAE AMS-M-3171. When abrasion resistance is a factor, an anodic treatment approved by the procuring activity shall be used. For new design, the use of magnesium is prohibited unless specifically approved by the procuring activity.

3.3.3.3 Aluminum alloy parts. Where practicable, aluminum alloy parts shall be covered with an anodic film conforming to MIL-A-8625. Small holes, threads, and case inserts need not be anodized. Aluminum alloys which do not anodize satisfactorily shall be coated with a chemical film in accordance with MIL-DTL-5541.

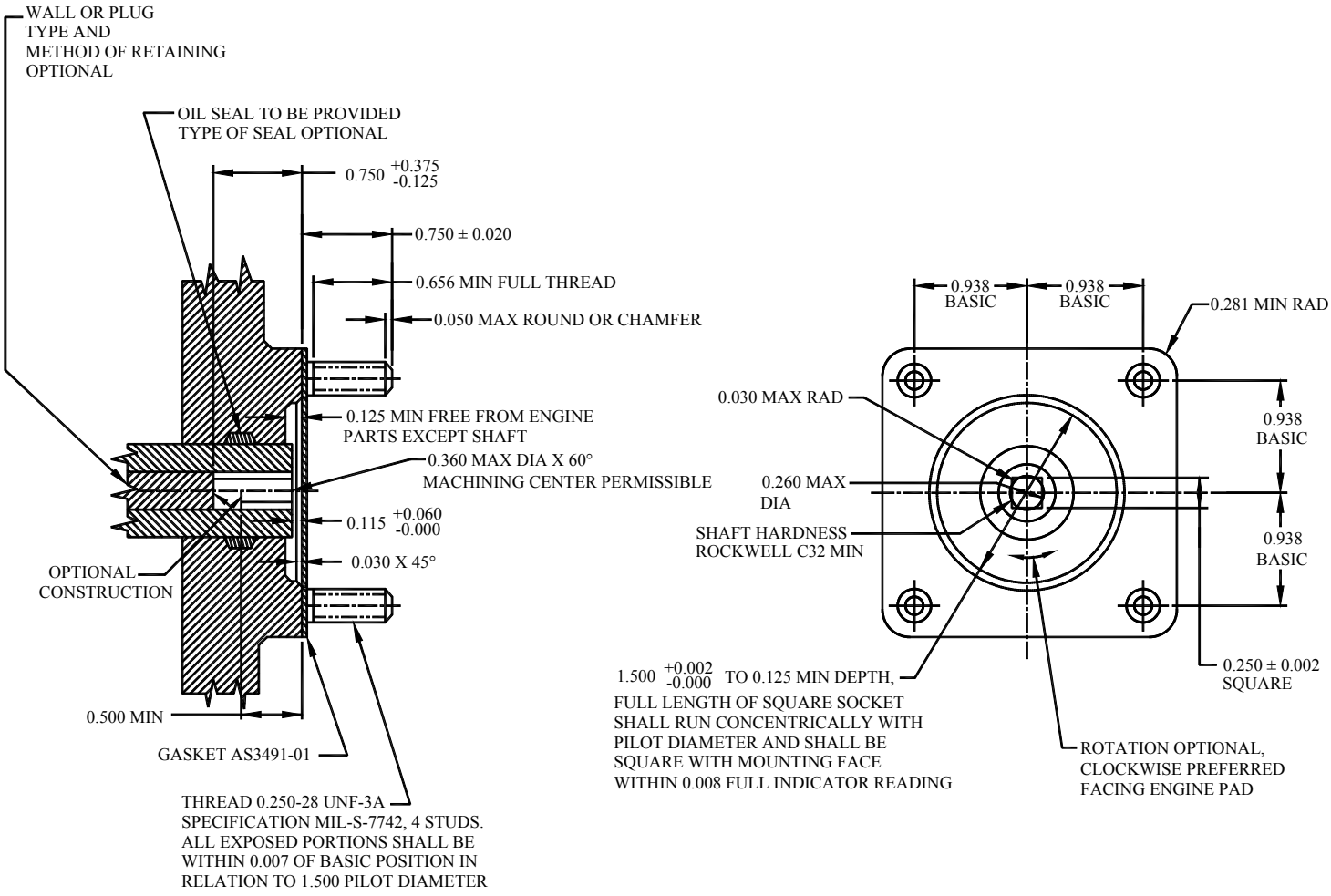
3.3.3.4 Iron and steel parts. Where practicable, iron and steel parts shall be chromium, nickel, cadmium, or zinc plated in accordance with SAE AMS-QQ-C-320, SAE AMS-QQ-N-290, SAE AMS-QQ-P-416, or ASTM B 633 respectively. Parts in a confined space in the presence of organic material shall be tin-cadmium plated in accordance with MIL-P-23408. The class and type of plating shall meet the requirements of 3.3.4.

3.3.4 Protective treatment. When materials are used in the construction of the generator that are subject to atmospheric or environmental conditions likely to cause corrosion in normal service life, they shall be protected against corrosion in a manner that will in no way prevent compliance with the performance requirements of this specification. Finishes and protective coatings that will crack, chip, or scale during normal service life or are affected by extreme atmospheric or environmental conditions shall not be used.

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

3.3.6 Fumes and vapors. Materials used in the construction of the generator shall not produce corrosive, deleterious, or toxic fumes or vapors under the conditions specified herein.

3.4 Design and construction. The generator shall be designed to operate at any speed up to 5,500 revolutions per minute (RPM) in either direction of rotation and in any mounting position. The generator shall conform to MS25038 and shall be suitable for mounting on a pad conforming to figure 1. The generator design shall be such that the output voltage shall be 3-phase, having a frequency of one cycle per revolution of the generator drive shaft. For calibration purposes of this specification, 4200 RPM will be 100 percent RPM. The generator shall be designed to withstand a steady 20g load applied along any of the three principal mutually perpendicular axes when mounted on a pad conforming to figure 1. The generator shall be constructed so that no parts will work loose in service and so that it will withstand the normal shocks, vibrations, and other conditions incident to shipping, storage, installation, and service without failure. The generator shall have 1,000 hours minimum operating life on an aircraft engine.



Notes:
1. Strength: Shall be capable of driving continuous torque load of 7 inch-pound (inlb) at any speed. The drive shall withstand a static torque of 50 inlb without failure or permanent deformation.
2. Oil leakage out of this drive should not exceed 1 cubic centimeter (cc) per hour.
3. Dimensions are in inches. Unless otherwise specified, tolerances: decimals ±0.010, angles ±2 degrees.
4. Pad outline as dimensioned is a basic minimum area requirement.

FIGURE 1. Drive - type XV engine accessory.

3.4.1 Maintenance. The design of the generator shall be such as to accommodate to the greatest possible extent, disassembly, reassembly, and service maintenance using those tools and items of maintenance equipment that are normally available as commercial standards.

3.4.2 Oil seal. The generator shall be provided with an oil seal at the drive shaft end as near the face of the mounting flange as possible.

3.4.3 Drain holes. The generator shall be provided with four drain holes as shown on MS25038.

3.4.4 Shaft.

3.4.4.1 Shaft hardness. The hardness of the drive end of the shaft shall be Rockwell C30 to C40 in accordance with ASTM E 18.

3.4.4.2 Shaft strength. The drive shaft shall be provided with a shear section that will fail within the torque limits of 35 inlb to 45 inlb.

3.4.4.3 Backlash. The shaft rotational backlash about its longitudinal axes shall not exceed 6 angular degrees.

3.4.5 Stator lock. The stator assembly shall have a locking means to prevent rotation between the stator or case and housing. A press fit will not be considered a locking means.

3.4.6 Weight. The generator shall be designed so that when completely assembled the weight shall not exceed 1.9 pounds.

3.4.7 Screw threads. Screw threads 0.060 inch in diameter or larger shall be in accordance with MIL-S-7742. All screws used in the construction of the generator shall be safety wired in accordance with NASM33540.

3.4.8 Bearings. The shaft shall be supported by at least two bearings, one at each end of the rotor. Wear shall be sustained by the bearings rather than by the supporting or attaching parts.

3.5 Electrical requirements.

3.5.1 Electrical connector. The generator shall be provided with a two-pin electrical connector conforming to MIL-DTL-5015 as shown on MS25038. The connector shall be suitable for use at high temperatures.

3.5.2 Electrical connections. The three leads from the generator windings shall be designated B, A, and C (conforming to phases 1, 2, and 3). The B and A leads shall be connected to the B and A pins of the electrical connector in such a manner that when the generator drive shaft is rotated in a counterclockwise direction (looking into the spline end of the shaft) the sequence of the generator output phase rotation shall be B, A, and C. The C lead shall be grounded to the frame of the generator.

3.5.3 Wire. All electrical wire including both winding and connecting wire shall be made of copper.

3.6 Performance. The generator shall perform satisfactorily when subjected to the inspections specified in section 4 of this specification.

3.6.2 Reliability.

3.6.2.1 Operational stability. The generator shall operate with satisfactory performance, continuously or intermittently, for a period of at least 1,000 hours without the necessity for any adjustment.

3.6.2.2 Reliability in mean time between failures (MTBF). The generator shall have a minimum mean time between failures of 1,000 hours when tested as specified in 4.5.24.

3.7 Identification of product.

3.7.1 Nameplate. A nameplate shall be securely attached to the exterior of the generator and shall be marked in accordance with the requirements of MIL-STD-130 except that the national stock number (NSN) shall be omitted.

3.7.2 Application marking. The marking "FOR USE WITH PERCENT RPM INDICATORS ONLY" shall be stamped in yellow on opposite sides of the stator shell. The marking shall be durable enough to withstand usage encountered in service.

3.7.3 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 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 numbers shall be governed by the drawing number requirements of MIL-DTL-31000.

3.9 Workmanship. The generator, including all parts and accessories, shall be constructed and finished in a thoroughly workmanlike manner. Particular attention shall be paid to neatness and thoroughness of soldering, wiring, impregnation of coils, marking of parts and assemblies, plating, painting, riveting, machine screw assemblage, welding and brazing, and freedom of parts from burrs and sharp edges.

4. VERIFICATION

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

a. Qualification 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 test conditions specified in the applicable test paragraphs of this specification.

4.2.1 Standard test conditions. Unless otherwise specified herein, all required tests shall be made under the following conditions:

a. Temperature - ambient room ((77 °F ± 9 °F) (25 °C ± 5 °C)).
b. Pressure - normal atmospheric (approximately 29.92 inches of mercury (Hg)).
c. Humidity - room ambient up to 90 percent relative humidity.

4.2.2 Test indicator. Whenever a tachometer indicator is specified for conducting tests, a magnetic drag-type indicator in accordance with MIL-I-22596 or MIL-I-25623 shall be used.

4.2.3 Voltage. All voltages specified herein are root-mean-square (RMS) values. Voltmeters used to measure voltage shall be of a type free from frequency errors. If the voltmeter draws appreciable current, the specified loads shall be adjusted so that the combined voltmeter and load will form a balanced load equivalent to the specified load. The voltmeter shall have an accuracy of 1 percent or better and meter errors shall not be included in the errors attributed to the generator. Unless otherwise specified, all voltage readings shall be made after a five and before a ten minute generator warm-up at 4,200 RPM with a load of three 40-ohm Y-connected resistances.

4.3. Qualification inspection. The qualification inspection shall consist of all the tests in the order specified in paragraph 4.5.

4.3.1 Qualification inspection sample. The qualification test samples shall consist of four generators representative of the production process. The generators submitted for qualification shall have previously been subjected to the individual tests specified in paragraph 4.4.1.

4.4 Conformance inspection. Conformance inspection shall consist of the individual tests of 4.4.1 for each unit produced and, if required by the procuring activity (see 6.2), sampling plan A (see 4.4.2) or sampling plan B (see 4.4.3). Conformance inspection shall be in accordance with MIL-STD-1916 as specified. The contractor shall furnish test reports showing quantitative results for all tests required by this specification that have been signed by an authorized representative of the contractor or laboratory, as applicable.

4.4.1 Individual tests. Each generator shall be subjected to the following tests.

a. Examination of product (see 4.5.1).
b. Dielectric strength (see 4.5.2).
c. Continuity and resistance (see 4.5.3).
d. Phase rotation (see 4.5.4).
e. Voltage (4.5.5).

4.4.2 Sampling plan A tests. Sampling plan A tests are in addition to the individual tests. The manufacturer shall select the type of sampling plan (attribute, variable, or continuous) in accordance with MIL-STD-1916. The sample size shall be selected in accordance with level I of MIL-STD-1916. The sampling plan A tests are as follows:

a. Individual tests (see 4.4.1)
b. Oil leakage (see 4.5.6).
c. Low temperature operation (see 4.5.7).
d. High temperature operation (see 4.5.8).
e. Vibration (see 4.5.9).

4.4.3 Sampling plan B tests. Sampling plan B tests are in addition to the individual tests (see 4.4.1) and the sampling plan A tests (see 4.4.2). The manufacturer shall select the type of sampling plan (attribute, variable, or continuous) in accordance with MIL-STD-1916. The sample size shall be selected in accordance with level I of MIL-STD-1916. The sampling plan B tests are as follows:

a. Individual tests (see 4.4.1).
b. Sampling plan A tests (see 4.4.2).
c. Vibration failure (see 4.5.10).
d. Low temperature exposure (see 4.5.11).
e. High temperature exposure (see 4.5.12).
f. Altitude high temperature (see 4.5.13).
g. Acceleration (see 4.5.14).
h. Short circuit (see 4.5.15).
i. Overspeed and reverse operation (see 4.5.16).
j. Endurance (see 4.5.17).
k. Internal examination (see 4.5.21).
l. Shaft failure (see 4.5.23).

4.5 Tests.

4.5.1 Examination of product. Each generator shall be examined externally to determine conformance to the applicable requirements of this specification not covered by tests.

4.5.2 Dielectric strength. A potential of 500 volts (V) RMS, commercial frequency, shall be applied between any electrical pin and metal parts of the generator case, including the electrical connector shell, prior to grounding the C lead for a period of 5 seconds. There shall be no breakdown of insulation.

4.5.3 Continuity and resistance. The stator windings of the generator shall be checked for continuity between the A and B electric connector pins and between the A and B pins and the generator frame. There shall be no evidence of discontinuity. The resistance between each pair of pins, or pin and case, shall be measured. The resistance between each pair of pins, or pin and case, shall be within 2.0 ohms of each other.

4.5.4 Phase rotation. The generator shall be properly connected to a test indicator (see 4.2.2). The wiring shall be arranged so that generator terminals marked A and B shall be connected to the indicator terminals marked A and B respectively. The C terminal of the indicator shall be grounded. The indicator shall indicate positively when the generator drive shaft is rotated in a counterclockwise direction (looking at the spline end of the shaft).

4.5.5 Voltage. The generator shall be operated at a drive shaft speed of 4,200 RPM with a load consisting of three 40-ohm Y-connected resistances (see 4.2.3). The three terminal voltages shall be 21 V ±1.5 V when measured at the generator terminals. When the generator is similarly operated at a shaft speed of 1,000 RPM with a load of three 20-ohm Y-connected resistances, none of the three terminal voltages shall be less than 3.5 V. The respective values shall be recorded and retained for reference.

CAUTION: Provide adequate ventilation during the following test.

4.5.6 Oil leakage. The generator shall be mounted on a fixture with the drive shaft horizontal and one of the drain holes at the bottom. Oil in accordance with MIL-PRF-7808 at a temperature of 250 ºF +18 ºF/-0 ºF (121 ºC +10 ºC/-0 ºC) and a pressure of one pound per square inch shall be applied to the drive shaft end of the generator while the generator is operated at 4,200 RPM with a load of three 40-ohm Y-connected resistances (see 4.2.3.). The quantity of oil that leaks out through the bottom drain hole in a one-hour period after the first drop appears shall not exceed 2 cubic centimeters (cc). If no oil appears after one hour of operation, the test shall be considered complete.

4.5.7 Low temperature operation. The generator shall be placed in a chamber, the temperature of which shall be controllable. The temperature of the circulating air shall be reduced to -67 ºF ± 9 ºF (-55 ºC ± 5 ºC) and held at this temperature for the duration of the test. The generator shall be kept in the chamber for not less than four hours after the temperature of -67 ºF (-55 °C) is reached before the test is started. The torque required to rotate the generator shaft shall not exceed 8 inlb. No damage to the generator shall result from this test.

4.5.8 High temperature operation. The generator shall be made to operate two test indicators (see 4.2.2) at a generator speed of 4,200 RPM at ambient room temperature (see 4.2.1). The generator terminal voltages shall be recorded. The generator shall then be subjected to a temperature of 350 ºF ± 9 ºF (177 °C ± 5 °C) for two hours and while at this temperature shall be made to operate continuously the same two test indicators at the same generator speed. The voltage output at high temperature shall not differ from the ambient room temperature voltage output by more than 5 V. No damage to any part of the generator shall result from this test. Upon return to room temperature, the generator shall be tested and meet the requirements of 4.5.5.

4.5.9 Vibration. The vibration test shall be conducted at room temperature in accordance with MIL-STD-810, test method 514.5, test procedure IV, tailoring category 22. The generator shall be connected to a standard load (see 4.2.3) and operated at 4,200 RPM. The generator, operating at 4,200 RPM shall be vibrated for three hours. After the vibration, the generator shall be subjected to and meet the requirements of 4.5.3 and 4.5.5.

4.5.10 Vibration failure. The test of 4.5.9 shall be conducted except that the ambient temperature shall be 350 ºF ± 9 ºF (177 °C ± 5 °C) and a test indicator (see 4.2.2) shall be used instead of the 40-ohm load. The generator output shall be monitored during the entire period. At no time shall the output voltage differ from the ambient room temperature value by more then 5 V, nor shall there be any discernable oscillation of the indicator pointer caused by the generator vibration. After vibration and after the generator has cooled to room temperature, the generator shall be subjected to and meet the requirements of 4.5.5.

4.5.11 Low temperature exposure. The generator shall be maintained at a temperature of -85 ºF ± 9 ºF (-65 ºC ± 5 ºC) for a period of 48 hours to 72 hours. At the end of this period and while the generator is still at that temperature, the torque required to rotate the generator shaft shall be measured and shall not exceed 12 inch-pounds. No damage to the generator shall result from this test.

4.5.12 High temperature exposure. The generator, operating a single test indicator (see 4.2.2), shall be subjected to an ambient temperature of 350 ºF ± 9 ºF (177 °C ±5 °C) for a period of two hours while operating at a shaft speed of 4,200 RPM. At the end of this time, the temperature shall be lowered to room temperature in a period of one hour. The generator shall be maintained at room temperature for a period of one hour. This temperature cycle shall be conducted six times. No damage to, or malfunction of, the generator shall result from this test. The generator shall then be subjected to and meet the requirements of 4.5.3 and 4.5.5.

4.5.13 Altitude high temperature. The generator shall be connected to a load of three 40-ohm Y-connected resistances (see 4.2.3) and operated at 4,200 RPM for 20 hours at a temperature of 302 ºF ± 9 ºF (150 ºC ± 5 ºC) at a pressure of 0.82 inches Hg (80,000 feet). The generator output shall be monitored and the respective terminal voltages shall not differ by more than 5 V from the output prior to this exposure. After return to room temperature and pressure for at least four hours, the generator shall be subjected to and meet the requirements of 4.5.5.

4.5.14 Acceleration. The generator shall be connected to a load consisting of three 40-ohm Y-connected resistances (see 4.2.3). The generator drive shaft shall be coupled to an electric motor that starts with an initial acceleration of 400 revolutions per second per second. The generator shall be subjected to this acceleration for 500 applications. The final speed of the motor on each application shall be 2,000 RPM to 3,600 RPM. No damage to any part of the generator shall result from this test.

4.5.15 Short circuit. The generator shall be connected to a load consisting of three 40-ohm Y-connected resistances (see 4.2.3) and operated at 4,200 RPM. The three terminal voltages shall be determined. The generator shall then be short circuited across all three terminals five times for a period of one second each time. After the generator has been allowed to cool to room temperature, it shall be subjected to and meet the requirements of 4.5.3 and 4.5.5.

4.5.16 Overspeed and reverse operation. The generator shall be connected to a load consisting of three 40-ohm Y-connected resistances (see 4.2.3) and operated at 4,200 RPM. The generator shall be operated with the specified load at 5,100 RPM for a period of five minutes, then in reverse direction at 4,200 RPM for a period of one minute. After the generator has been allowed to cool to room temperature, it shall be subjected to and meet the requirements of 4.5.5.

CAUTION: Provide adequate ventilation during the following test.

4.5.17 Endurance. The generator shaft rotational backlash shall be measured and shall meet the requirements of 3.4.4.3. The generator shall then be mounted on the engine accessory drive of figure 1. The drive shall have its centerline displaced 0.007 inch from centerline of the pilot and the generator mounting pad face shall be canted 0.008 inch TIR out of square with the centerline. The generator shall then be connected to three 20-ohm 100-watt Y-connected resistances. Two generators shall be operated on this drive, with this load, and with the generator supplied with oil in accordance with MIL-PRF-7808 as specified in 4.5.6 for 1,000 hours in the independent continuous simultaneous cycles shown in table I.

TABLE I. Endurance test cycles.

Speed	Temperature	Time
350 RPM ± 50 RPM for one minute	350 ºF ± 9 ºF (177 °C ± 5 °C)	24 ± 8 hours
then	Ambient room temperature	4 ± 2 hours
	-67 ºF ± 9 ºF (-55 ºC ± 5 ºC)	24 ± 8 hours
4,200 RPM ± 50 RPM for four minutes	Ambient room temperature	4 ± 2 hours

4.5.17.1 Oil leakage control group test. Two other generators shall be operated in the same manner except they shall not be supplied with oil as specified in 4.5.6.

4.5.17.2 Milestone checkpoints. At the conclusion of each 100 hours, each generator shall be subjected to and meet the requirements of 3.4.4.3 and 4.5.5. At the conclusion of 1,000 hours, each generator shall be subjected to and meet the requirements of 4.5.6 except that 5 cc leakage shall be allowed. No screw or other part shall become loosened or damaged as a result of this test.

4.5.18 Humidity. The generator shall be mounted with the shaft in a horizontal position and tested as specified in MIL-STD-810, test method 507.4. The external connections shall be made to the generator in such a manner as to simulate installed conditions. The generator shall be subjected to and meet the requirements of 4.5.2 within one hour after the generator is removed from the humidity chamber. The generator shall then be subjected to and meet the requirements of 4.5.3 and 4.5.5.

4.5.19 Fungus resistance. The generator with external connections, to simulate installed conditions, shall be subjected to a fungus test in accordance with MIL-STD-810, test method 508.5, except the test period will be 14 days. At the option of the procuring activity, fungus tests on components parts of the generator may be accepted in lieu of or in addition to tests on the assembled generator.

4.5.20 Salt spray. The generator shall be subjected to a salt fog test in accordance with MIL-STD-810, test method 509.4 except spray will be for a continuous period of 50 hours. The external connections shall be made to the generator in such a manner as to simulate installed conditions. At the end of the 50-hour period, the generator shall be subjected to and meet the requirements of 4.5.1 and 4.5.2. The generator shall also be subjected to 4.5.6 but the allowed leakage shall be 5 cc for the 1-hour period.

4.5.21 Internal examination. The generator shall be examined internally. Evidence of excessive wear or other deterioration shall be cause for rejection.

4.5.22 Disassembly-reassembly. The generator shall be disassembled to the extent that all fastened parts, except press-fit or shrink-fitted parts, are separated. The fastener hardware guideline of MIL-HDBK-454 may be used as guidance to ensure that the fastening means are sufficient. The generator shall then be completely reassembled reusing all fasteners of the original assembly except that new safety wire shall be used and sealing compounds shall not be used. The generator shall then be operated to determine that it runs properly and that all parts are satisfactorily mated. The disassembly and reassembly as described above shall be done five times on each generator and the same requirements shall be met.

4.5.23 Shaft failure. The generator shall be disassembled. The shaft shall then be torqued until it fails. The torque required for shaft failure shall be measured and shall be 35 inlb to 45 inlb.

4.5.24 Reliability.

4.5.24.1 Reliability test plan and report. Prior to starting the reliability test, the manufacturer shall submit a detailed reliability test plan for formal approval by the procuring activity. The manufacturer may refer to the requirements specified in test plan I-D of MIL-HDBK-781 as a guide for the reliability test plan. The manufacturer shall prepare a final report that summarizes the achieved reliability of the test samples. The report shall also contain test procedures, details of any malfunctions, and applicable charts and graphs showing failures/MTBF plotted against test time and other pertinent test data. The manufacturer may refer to the guidelines outlined in MIL-HDBK-831 for preparing the report.

4.5.24.2 Reliability test. Three generators shall be tested for reliability. Generators selected for reliability testing shall have previously been subjected to and passed the individual tests specified in paragraph 4.4.1. The reliability test shall consist of the endurance test of 4.5.17. For reliability tests, the oil seals shall be supplied with oil.

4.5.25 Maintenance of qualification. At specified intervals determined by the qualifying activity, the manufacturer must be able to demonstrate that the company still has the capabilities and facilities necessary to produce the QPL item(s) in accordance with this specification and the provisions governing qualifications in accordance with SD-6.

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 command. 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 tachometer generator covered by this specification is intended for use on turboprop and turbojet engines to generate electrical signals for transmission to tachometer indicators in accordance with MIL-I-22596, MIL-I-25623, or other indicator specified by the procuring activity to indicate percent RPM.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. The specific issue of individual documents referenced (see 2.2.1, 2.2.2, and 2.3).
c. Sampling plan A or B, if required (see 4.4).
d. Packaging (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL-9398 whether or not such products have actually been listed by that date. The attention of the contractors is called to these requirements, 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. Information pertaining to qualification of products may be obtained from Defense Supply Center Richmond, Attn: DSCR-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297 or STDZNMGT@dla.mil.

6.4 Subject term (key word) listing.

electrical
engines
indicator
RPM
turbojet
turboprop

6.5 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.

Custodians:
Army - CR4
Navy - AS
Air Force - 99

Preparing Activity:
DLA - GS1

(Project 6620-0735-000)

Review Activity:
Army - AV

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 database at http://assist.daps.dla.mil.