MIL-G-9398C

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SUPERSEDING
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MILITARY SPECIFICATION

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

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

1 SCOPE

1.1 Scope - This specification covers design and all performance requirements for procurement of two-pole, alternating current tachometer generators

* 1.2 Classification -

MS25038-4	Two-pole tachometer generator

2 APPLICABLE DOCUMENTS

* 2.1 General - The following documents, of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein.

SPECIFICATIONS

Federal

QQ-C-320	Chromium Plating (Electrodeposited)
QQ-N-290	Nickel Plating (Electrodeposited)
QQ-P-416	Plating, Cadmium (Electrodeposited)
QQ-Z-325	Zinc Coating, Electrodeposited
PPP-B-636	Requirements for Box, Fiberboard

FSC 6620

SPECIFICATIONS (Continued)

Military

MIL-P-116	Preservation, Methods of
MIL-D-1000	Drawings, Engineering and Associated List
MIL-M-3171	Magnesium Alloy, Processes for Corrosion Protection of
MIL-C-5015	Connectors, Electric, "AN" Type
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification for
MIL-C-5541	Chemical Films for Aluminum and Aluminum Alloys
MIL-O-6081	Oil, Lubricating, Jet Engine
MIL-L-6387	Lubricating Oil, Synthetic Base
MIL-S-6872	Soldering Process, General Specification for
MIL-I-7069	Indicators, Tachometer Electric Percent Speed Type, Aircraft, General Specification for
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series General Specification for
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-P-7936	Parts and Equipment, Aeronautical Preparation for Delivery
MIL-A-8625	Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-L-9236	Lubricating Oil, Aircraft Turbine Engine, High Temperature

SPECIFICATIONS

Military (Continued)

MIL-I-22596	Indicator, Tachometer, Electric 0-120 Percent RPM, 2-Inch Size
MIL-P-23408	Plating Tin-Cadmium (Electro-deposited)
MIL-L-25336	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, High Film Strength

STANDARDS

Military

AND-20005	Drive-Type XV Engine Accessory
MIL-STD-130	Identification Marking of U S Military Property
MIL-STD-143	Specifications and Standards, Order of Precedence for the Selection of
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-781	Reliability Tests Exponential Distribution
MS25038	Generators, Tachometer and Synchronizing, Piston and Turbine Engines
MS33540	Safety Wiring, General Practices for
MS33586	Metals, Definition of Dissimilar

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Qualification - The generators furnished under this specification shall be a product which has been tested and meets the Quality Assurance Provisions specified herein, and has been listed on or approved for listing on the applicable qualified products list

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

3.2.2 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 parts, such as screws, bolts, nuts, cotter pins having suitable properties shall 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

3.3 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 - 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 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 during normal service life

3.3.3.1 Dissimilar metals - Dissimilar metals as defined in MS33586 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 MIL-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-C-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 QQ-C-320, QQ-N-290 QQ-P-416 or QQ-Z-325, 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 material 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 which will crack, chip or scale during normal service life or are affected by extremes of atmospheric or environmental conditions, shall not be used.

* 3.3 5 Fungus-proof materials -Materials which 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 5500 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 AND20005 The generator design shall be such that the output voltage shall be three 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 AND20005 The generator shall be so constructed that no parts will work loose in service and will withstand the normal shocks, vibrations, and such other conditions as are incident to shipping, storage, installation, and service without failure The generator shall have 1000 hours minimum operating life on an aircraft engine.

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 which 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.

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 to 45 pound-inches

* 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 so designed 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 MS33540.

* 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 Electric connector - The generator shall be provided with a two-pin electric connector conforming to Specification MIL-C-5015 as shown on MS25038 except that the connector shall be suitable for use at high temperature

* 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 electric connector in such a manner that when the generator drive shaft is rotated in a counter-clockwise 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 wiere, 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

3.6.1 Reliability -

3.6.1.1 Operation Stability - The generator shall operate with satisfactory performance, continuously or intermittently for a period of at least 1000 hours without the necessity for any adjustment.

3.6.1.2 Reliability in Mean Time Between Failure (MTBF) - The generator shall have 1000 hours of mean (operating) time between failures when tested and accepted as outlined under the requirements of 4.4.3.

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 FSN 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 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 Specification MIL-D-1000

3.9 Soldering - Soldering shall be performed in accordance with MIL-S-6872

* 3 10 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 QUALITY ASSURANCE PROVISIONS

* 4 1 Responsibility for inspection - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein Except as otherwise specified the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 that supplies and services conform to prescribed requirements

4.2 Classification of inspection - Inspection of the generator shall be classified as follows:

(a) Qualification inspections: Qualification inspection consists of examinations and tests performed on sample generators submitted for approval as a qualified product.

(b) Quality conformance inspection:- Quality conformance inspection consists of examinations and tests performed on generators manufactured and submitted for acceptance under contract.

* 4.3 Qualification inspection - The qualification inspection of the generators shall consist of all of the examinations and tests of this specification performed in the order specified under the paragraph headed Inspection methods and shall include the reliability test for the Reliability Qualification Phase. Unless otherwise stated in the contract the tests of the Reliability Sampling Phase only are required.

* 4.3.1 Qualification inspection sample - Qualification inspection samples shall consist of four generators manufactured in accordance with this specification. The generators submitted for qualification inspection shall have been previously subjected only to the Individual inspections The samples shall be forwarded at the contractor's expense, to the laboratory designated in the Letter of Authorization.

* 4.3.1.1 Qualification inspection sample identification - The qualification inspection samples shall be plainly identified by durable tags, securely attached, and marked with the following information:

Sample for Qualification Inspection
Generator, Tachometer, Two Pole,
High Temperature, Aircraft
Submitted by (Manufacturer's name, date)
for Qualification Inspection in accordance
with Specification MIL-G-9398 under
authorization (reference letter authorizing
tests)

* 4.4 Quality conformance inspection - The Quality conformance inspection shall consist of the Individual inspection, the Sampling Plans, and the Reliability assurance tests of this specification. The contractor shall furnish all samples and shall be responsible for accomplishing all the inspections. Sampling plan B inspections shall be conducted at a Government laboratory designated by the procuring activity. Quality conformance inspection, except for Sampling plan B, shall be under the supervision of the Government quality control representative. The contractor shall furnish test reports showing quantitative results for all tests required by this specification, signed by an authorized representative of the contractor or laboratory as applicable. 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 inspection - Each generator submitted for acceptance shall be subjected to the Individual inspections. This inspection shall determine compliance with the requirements of material, workmanship, operational adequacy, and reliability. As a minimum, each generator accepted shall have passed the following inspections.

Examination of product
Dielectric strength
Continuity and resistance
Phase rotation
Voltage

* 4.4.2 Sampling plans - The Sampling plans shall consist of Sampling plan A and Sampling plan B inspections. The inspection samples selected for sampling tests shall first have passed the Individual inspections. The inspection samples which have been subjected to Sampling plan A inspection shall not be delivered on contract until they have been refurnished (see 6.3) and resubmitted and passed all the Individual inspections. Inspection samples which have been subjected to the Sampling plan B inspection shall not be delivered on contract.

* 4.4.2.1 Sampling plan A sample selection - Sampling plan A samples shall be selected at random in accordance with the following schedule:

Quantity Offered for Acceptance	Quantity to be Selected for Inspection
First 15	(See Note)
Next 50	1
Next 75	1
Next 100	1
Each additional 200 or fraction thereof	1

NOTE. When Sampling plan B is invoked, the quantity shall be zero When Sampling plan B is to be omitted, the quantity shall be one

When a defective generator occurs, no items from those still on hand or later produced shall be accepted until the extent and cause of failure have been determined and appropriately corrected In addition when a failure occurs, shift to one sample out of fifteen (when Sampling plan B is omitted) and proceed as indicated

4 4 2 1 1 Sampling plan A inspection - Each generator selected for Sampling plan A inspection shall be subjected to the following tests conducted in the order listed

Oil leakage
Low temperature operation
High temperature operation
Vibration

4 4 2 2 Sampling plan B instructions - Four generators shall be selected at random from the first 15 produced on contract and submitted within 10 days after manufacture These generators shall be forwarded, at the contractor's expense, to a Government Laboratory designated by the procuring activity Each sample shall be plainly identified by a securely attached durable tag marked with the following information

GENERATOR, TACHOMETER, TWO-POLE
HIGH TEMPERATURE, AIRCRAFT
Submitted by (Manufacturer's name date)
for production acceptance Sampling plan
B testing, in accordance with Contract/
Order No _____
Manufacturer's part number _____

4 4 2.2 1 Sampling plan B approval - Approval of sampling plan B generators shall be by the procuring activity upon satisfactory completion of the designated tests Any design material or performance defect made evident during this test shall be corrected by the contractor to the satisfaction of the procuring activity Failure of the sample units to pass any of the tests shall be cause for deliveries of equipment under the contract to cease until proper corrective action is approved and accomplished.

* 4.4.2.2.2 Sampling plan B inspection - Each generator selected for Sampling plan B inspection shall be subjected to the following tests, conducted in the order listed.

Sampling plan A tests
Vibration failure
Low temperature exposure
High temperature exposure
Altitude high temperature
Acceleration
Short circuit
Overspeed and reverse operation
Endurance
Internal examination
Shaft failure

* 4 4 3 Reliability Assurance Tests - Reliability Assurance Tests shall be conducted using MIL-STD-781 Qualification Phase and Sampling Phase Tests shall be conducted Equipments selected for reliability assurance tests shall first have passed the Individual tests

* 4 4 3.1 Reliability Qualification Phase - Prior to Qualified Products Listing (see 4 3) ,a minimum of three (3) equipments shall be tested as outlined in MIL-STD-781, under the section entitled "Qualification Phase of Production Reliability Tests " The maximum number of equipments to be used shall be those listed in Table 5 of MIL-STD-781 For the Qualification Phase the Accept-Reject Criteria for Test Plan 1 shall be used

* 4 4 3 2 Reliability Sampling Phase Tests - Samples of the equipment shall be tested as outlined in MIL-STD-781, under the Section entitled "Sampling Phase of Production Reliability Tests." For the Sampling Phase, the Accept-Reject criteria for Test Plan II shall be used to determine the length of the tests (until an accept or reject decision is reached).

* 4 4 3 2 1 Lot Size for Sampling Phase - The entire contract quantity (with the exception of those equipments used in the Qualification Phase) shall be considered one lot The test program shall start the first month after the Qualification Phase has been completed Samples shall be selected and placed on test in the same manner as though one month's production was a lot The samples shall be tested until an accept or reject decision is reached

In the meantime other equipments constructed shall be shipped. The test results shall be summarized monthly for the procuring activity. The procuring activity reserves the right to stop the acceptance of equipment at any time after one or more reject decisions have been reached pending a review of the contractor's efforts to improve the equipment the equipment parts, the equipment quality control etc, so that the entire contract quantity will show an accept decision

* 4.4.3.3 Test Details - The test details such as the length of the Test cycle, the length of the heat portion of the cycle, the performance characteristics to be measured, special failure criteria, preventive maintenance to be allowed during the test etc shall be part of the test procedures to be submitted to and approved by the procuring activity prior to the beginning of the Qualification Test Phase of the Reliability Assurance Tests The following paragraphs shall be considered minimum conditions and shall apply to both the Qualification and Sampling phases

* 4 4 3.3 1 Duty cycle and Test level - Paragraph 4 6 17 shall be considered to constitute the Duty cycle and Test level For the Reliability tests the oil seals shall be supplied with oil

* 4 4 3.3.2 Performance characteristics to be measured - The requirements of 4 6 17 apply.

* 4.4.3 3.3 Failure criteria - Whenever performance characteristics fall below the acceptance requirements (4 4 3 3.2) at least one failure has occurred If subsequent analysis reveals that several parts have deteriorated, each should be counted a failure unless one part caused the other parts to fail

* 4.4 3.3.4 Preventive maintenance - Other than the requirements specified in 4.6 17 no preventive maintenance shall be performed on the generators during the Reliability test

4.4 3 3.5 Disposition of samples upon completion tests - Any sample tested other than those tested under the Reliability Qualification Phase , may be delivered on contract provided it meets all the following requirements

(a) It is representative of production units currently being accepted

(b) It is in "good as new" condition or has been refurbished (See 6.3).

(c) It is otherwise satisfactory.

4.5 Inspection conditions -

4 5 1 Standard conditions - Unless otherwise specified, all tests required shall be made under the following conditions

Temperature - Room ambient (25±5°C)
Pressure - Normal atmospheric (approximately 29.92 inches Hg)
Humidity - Room ambient up to 90 percent relative humidity.

* 4.5.2 Voltages - All voltages specified herein are 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 so adjusted that the combined voltmeter and loads will form a balanced load equivalent to the specified load The voltmeter shall have an accuracy of 1% or better and meter errors shall not be included in the errors attributable to the generator Unless otherwise specified, all voltage readings shall be made after a five , and before ten, minute generator warmup at 4200 RPM, with a load of three 40-ohm Y-connected resistances.

* 4 5.3 Test indicator - Whenever a tachometer indicator is specified for conducting tests, a magnetic drag-type electric tachometer indicator in accordance with MIL-I-22596, or MIL-I-7069 shall be used.

4 6 Inspection methods -

4.6.1 Examination of product - Each generator shall be examined externally to determine conformance to the applicable drawings and to all the requirements of the specification not covered by tests.

4 6 2 Dielectric strength - A potential of 500V 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 6.3 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.

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

* 4 6 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, and the three terminal voltages shall be 21 ± 1 5V 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 5V. The respective values shall be recorded and retained for reference.

4 6 6 Oil leakage - The generator shall be mounted on a fixture, with the drive shaft horizontal and a drain hole at the bottom. Oil at a minimum temperature of 121° C and a pressure of one psi shall be applied to the drive shaft end of the generator while the generator is operated at 4200 RPM. The generator load shall consist of three 40-ohm Y-connected resistors The quantity of oil that leaks out through the drain hole in a one hour period, after the first drop appears, shall not exceed 2 cc. If no oil appears at the drain hole after one hour of operation the test shall be considered complete. The test shall be conducted with the generator using each of the following oils separately 1010 oil in accordance with MIL-O-6081, oil in accordance with MIL-L-6387, MIL-L-7808, MIL-L-9236, and MIL-L-25336

CAUTION Provide adequate ventilation during this test

4.6.7 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 -55°C and held at this temperature for the duration of the test The generator shall be kept in the chamber for not less than 4 hours after the temperature of -55°C is reached before the test is started. The torque which is required to rotate the generator shaft shall then be determined. This torque shall not exceed 8 pound-inches. No damage to the generator shall result from this test.

* 4.6.8 High temperature operation - The generator shall be made to operate two indicators at generator speeds of 4,200 RPM. The generator terminal voltages shall be recorded. The generator shall then be subjected to a temperature of 177 ± 5°C for 2 hours and while at this temperature shall be made to operate continuously the same indicators at the same generator speed.

The voltage output at high temperature shall not differ from the voltage output by more than 5 V from the output prior to this temperature No damage to any part of the generator shall result from this test Upon return to room temperature the generator shall be subjected to, and meet, the requirements of 4.6 5.

* 4 6.9 Vibration - The test shall be conducted at room temperature in accordance with the Vibration tests, Procedure XII curve A, of MIL-E-5272 The generator shall be connected to a load consisting of three 40-ohm Y-connected resistances and operated at 4,200 RPM. The generator, operating at 4,200 RPM as above, shall then be vibrated for three hours at the most severe point of resonance, or a 55 cps 0.060-inch condition if no resonance point is found After the vibration the generator shall be subjected to and meet the requirements of 4 6 3 and 4 6 5

* 4 6 10 Vibration failure - The test described in 4 6 9 shall be conducted except that the ambient temperature shall be 177 ± 5°C and that an indicator in accordance with MIL-I-22596 or MIL-I-7069 shall be used in lieu 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 starting room temperature value by more than 5V, no shall there be any discernible 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 6 5

4 6 11 Low temperature exposure - The generator shall be maintained at a temperature of -65°C for a period of 48 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 pound-inches No damage to the generator shall result from this test

* 4 6 12 High temperature exposure - The generator, operating a single indicator, shall be subjected to the following temperature exposure while operating at a shaft speed of 4,200 RPM The generator shall be subjected to an ambient temperature of 177 ±5°C for a period of 2 hours At the end of this time the temperature shall be lowered from 177 ±5°C to room temperature in a period of one hour The generator shall be maintained at room temperature for a period of one hour. This cycle shall be conducted 6 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 4.6.3 and 4.6.5.

* 4 6.13 Altitude high temperature - The generator shall be operated at 4,200 RPM into three 40-ohm Y-connected resistances for 20 hours while the generator is maintained at a temperature of 150°C in a pressure of 0.82 inches of Hg(80,000 ft) 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 4.6.5.

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

* 4.6.15 Short circuit - The generator shall be connected to a load consisting of three 40-ohm Y-connected resistances and operated at 4,200 RPM. The three terminal voltages shall be determined The generator shall then be short-circuited 5 times for a period of 1 second each time across all three of the generator terminals After the generator has been allowed to cool to room temperature, the generator shall then be subjected to, and meet, the requirements of 4.6.3 and 4.6.5.

* 4 6 16 Overspeed and reverse operation - The generator shall be connected to a load consisting of three Y-connected 40-ohm resistances, and operated at 4,200 RPM The generator shall be operated with the specified load at 5,100 RPM for a period of 5 minutes, then in the reverse direction at 4,200 RPM for a period of 1 minute After the generator has been allowed to cool to room temperature, it shall be subjected to, and meet, the requirements of 4.6.5

* 4.6 17 Endurance - The generator shaft rotational backlash shall be measured and shall be within the requirements of 3.4.4.3. The generator shall then be mounted on an especially constructed simulated engine accessory drive generally in accordance with AND 20005 The drive shall have its centerline displaced 0 007 inch from the 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 resistors. Two of the generators shall be operated on this drive, with this load and with the generator supplied with oil as outlined in 4.6.6 for 1000 hours in the following independent continuous simultaneous cycles.

Speed	Temperature	
350 ± 50 RPM one minute	177 ± 5°C	24 ± 8 hours
	Room Temp	4 ± 2 hours
4200 ± 50 RPM four minutes	-55 ± 5°C	24 ± 8 hours
	Room Temp	4 to 2 hours

The two other generators shall be operated in the same manner except that they shall not be supplied with oil as outlined in 4.6.6.

At the conclusion of each 100 hours each generator shall be subjected to and meet the requirements of 4.6.5 and 3 4 4 3. At the conclusion of 1000 hours each generator shall be subjected to and meet the requirements of 4.6.6 except that 5 cc leakage shall be allowed

No screw or other part shall become loosened or damaged as a result of this test.

CAUTION Provide adequate ventilation during this test.

* 4 6 18 Humidity - The generator shall be mounted with the shaft in a horizontal position and tested as specified in the Humidity tests, Procedure I, of MIL-E-5272. 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 4.6.2 within one hour after the generator is removed from the humidity chamber The generator shall then be subjected to and meet, the requirements of 4.6.3 and 4.6.5.

* 4.6 19 Fungus resistance - The generator with external connections, to simulate installed conditions, shall be subjected to the Fungus resistance tests, Procedure I, of MIL-E-5272, except that the test period shall be 14 days At the option of the procuring activity, fungus tests on component parts of the generator may be accepted in lieu of or in addition to tests on the assembled generator

* 4.6 20 Salt spray - The generator shall be subjected to a salt spray test in accordance with Procedure I of MIL-E-5272 for a 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 the 4.6.1 and 4.6.2. The generator shall also be subjected to 4.6.6 but the allowed

leakage shall be 5 cc for the 1 hour period. The oil used for this leakage test shall be of the type that allowed the greatest leak for a particular generator in any previous test. If no leakage occurred the oil used may be any one of those listed under 4.6.6.

4.6.21 Internal examination - The generator shall be examined internally. Evidence of excessive wear, or other untoward deterioration shall be cause for rejection.

4.6.22 Disassembly-reassembly - The generator shall be disassembled to the extent that all fastened parts, except press or shrink fitted parts are separated. The fastening means shall be noted and all shall be in accordance with Requirement 12 of MIL-STD-454, except that Sealing Compounds shall not be used. The generator shall then be completely reassembled reusing all fasteners of the original assembly except that new safety wire shall 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.

4.6.23 Shaft failure - The generator shall be disassembled. The shaft shall then be caused to fail. The torque required for shaft failure shall be measured and shall be 35 to 45 pound-inches.

5 PREPARATION FOR DELIVERY

5.1 Packaging - The generator shall be packaged in accordance with MIL-P-7936 Level A or B as specified in contract or order (see 6.2). For Level A packaging the method of preservation shall be accordance with Specification MIL-P-116 Method 1A-5 without preservation compound using metal reusable containers, or Method 1A5 without preservation compound, overboxed in a container conforming to PP-B-636, whichever is specified in contract or order.

5.2 Packing - The generator shall be packed in accordance with MIL-P-7936, Level A, B or C as specified in contract or order (see 6.2).

5.3 Marking - The interior and exterior containers shall be marked as specified in MIL-P-7936.

5.3.1 Precautionary marking - The following precautionary markings shall appear conspicuously on two opposite sides of each interior package and shipping container whenever practicable.

FRAGILE
DELICATE INSTRUMENT
HANDLE WITH CARE

6. NOTES

* 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 the tachometer indicator in accordance with MIL-I-7069, to indicate percent RPM.

* 6.2 Ordering data - Procurement documents should specify the following

(a) Title, number and date of this specification

(b) The quantity, MS part number, dash number and type number if any of the generator desired

(c) Levels of packaging (see 5.1) and packing (see 5.2) desired

(d) The laboratory that shall conduct tests (see 4.3.1 4.4. 4 4.2.2)

(e) Reliability Test Phases (see 4.3).

6.3 Definitions -

* 6.3.1 Amplitude - Whenever the word "amplitude" is used it shall mean the extent of motion as measured from one extreme to the opposite extreme

6.3.2 Good as new - "Good as new" shall mean generators operated less than 10 percent of the specified MTBF operation

* 6.3.3 Refurbished - "Refurbished" shall mean that the generator has been completely overhauled with all component parts meeting current part standards, and the generator shall have been subjected to and met all the requirements of a new generator

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 the Naval Air Systems Command, Department of the Navy, Washington, D. C. 20360, and information pertaining to qualification of products may be obtained from that activity.

* 6.5 Changes from previous issue - The outside margins of this specification have been marked "*" to indicate where changes from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written irrespective of the marginal notations and relationship to the last previous issue.

* 6.6 Precedence of documents - When the requirements of the contract, this specification, or applicable subsidiary specifications are in conflict, the following precedence shall apply.

(1) Contract - The contract shall have precedence over any specification.

(2) This specification - This specification shall have precedence over all applicable subsidiary specifications. Any deviation from this specification, or from subsidiary specifications where applicable, shall be specifically approved in writing by the procuring activity.

(3) Referenced specifications - Any reference specification shall have precedence over all applicable subsidiary specifications referenced therein. All reference specifications shall apply to the extent specified.

* Custodians
Air Force - 11
Army - MO
Navy - AS

* Preparing Activity
AS

* Review Activities
Air Force - 11
Army - MO
Navy - AS

* User Activities
Air Force -
Army -
Navy -

* Project No 6620-0095

* Reviewer/user information is current as of the date of this document For future coordination of changes to this document, draft circulation should be based on the information in the Current Federal Supply Classification Listing of DOD Standardization Documents

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost Comments and the return of this form will be appreciated Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*

SPECIFICATION
MIL-G-9398C Generator, Tachometer, Two-Pole, High Temperature, Aircraft

ORGANIZATION *(Of submitter)*	CITY AND STATE

CONTRACT NO	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A GIVE PARAGRAPH NUMBER AND WORDING

B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3 IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*	DATE

DD FORM 1 APR 63 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-0375

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