

MIL-M-62368A(AT)  
6 May 1986  
SUPERSEDING  
MIL-M-62368(AT)  
18 January 1984

## MILITARY SPECIFICATION

### MOTOR, GEARHEAD, 18-30 VOLTS, DIRECT CURRENT

This specification is approved for use by the US Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers a direct current gearhead motor used to operate the Remote Arming Device (RAD) on a military ground vehicle.

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, 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 6105

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SPECIFICATIONS  
FEDERAL

QQ-P-416 - Plating, Cadmium (Electrodeposited).

## MILITARY

MIL-C-5541 - Chemical Conversion Coatings on Aluminum and Aluminum Alloys.  
 MIL-A-8625 - Anodic Coatings for Aluminum and Aluminum Alloys.  
 MIL-G-23827 - Grease, Aircraft and Instrument, Gear and Actuator Screw, NATO Code Number G-354 Metric.

STANDARDS  
MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection By Attributes.  
 MIL-STD-130 - Identification and marking of US Military Property.  
 MIL-STD-143 - Standards and Specifications, Order of Precedence for the selection of.  
 MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.  
 MIL-STD-454 - Standard General Requirements for Electronic Equipment.  
 MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.  
 MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of.  
 MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.  
 MIL-STD-889 - Dissimilar Metals.  
 MIL-STD-1275 - Characteristics of 28 Volt DC Electrical Systems in Military Vehicles.  
 MIL-STD-1523 - Age Control of Age-Sensitive Elastomeric Material (For Aerospace Applications).  
 MIL-STD-45662 - Calibration Systems Requirements.

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

DRAWINGS  
ARMY

12265908 - Motor, Gearhead.

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

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, 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 First article. Unless otherwise specified (see 6.2), the contractor shall furnish motors which shall be subjected to first article inspection (see 4.4). First article inspection samples, properly marked with identifying information, shall be representative of the units to be furnished to the Government. All subsequent motors delivered to the Government shall conform to these samples in all of their pertinent physical and performance attributes.

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards and drawings. Specifications and standards for all materials, parts, and processes which are not specifically designated herein, and which are necessary for the execution of this specification shall be selected in accordance with MIL-STD-143 (see 4.6.1 and 6.3).

3.2.1 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be placed in direct contact. When protection is used, it shall be such type that a low impedance path is offered to radio frequency currents. Dissimilar metals are defined in MIL-STD-889 (see 4.6.1).

3.2.2 Age sensitive materials. The use of age-sensitive elastomers, as defined by MIL-STD-1523, shall be identified and controlled in accordance with that standard (see 4.6.1).

3.2.3 Gearing. All gearing shall be of the necessary materials, finishes, and precision to provide reliable performance as outlined herein (see 4.6.1).

3.2.4 Lubrication. The unit shall be lubricated with grease conforming to MIL-G-23827 and shall not require lubrication during the service life of the assembly (see 4.6.1).

3.2.5 Cover and mounting flange. Material shall be suitable for the intended purpose. Aluminum shall be chemical film treated in accordance with MIL-C-5541, or anodized as specified in MIL-A-8625. Non-corrosion resistant materials shall be cadmium plated in accordance with QQ-P-416, class 2 (minimum), type II (see 4.6.1).

3.3 Construction. The motor and the output shaft shall conform to Drawing 12265908 (see 4.5.2, 4.6.1 and 4.6.2).

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3.3.1 Backlash. Backlash shall be no more than 3 degrees ( $^{\circ}$ ) (see 4.6.1).

3.3.2 Standard parts. Standard utility parts, such as screws, bolts, nuts, cotter pins, etc., shall be selected in accordance with the applicable requirements of MIL-STD-454 (see 4.6.1).

3.3.3 Bearings. Bearings shall be suitable for their intended purpose. Bearings which are exposed to the environment shall be of the sealed type (see 4.6.1).

3.3.4 Moisture pockets. Pockets, wells, and traps in which water or condensed water vapor can collect shall be avoided. Lead wire entry shall be sealed to prevent entrance of contamination into the motor (see 4.6.1).

3.4 Performance. Unless otherwise specified herein, the motor shall meet all performance requirements of this specification with an applied voltage of  $24 \pm 0.5$  volts (V) direct current (dc), and with the motor flange mounted on a  $1/8$  by  $1-7/8$  by 3 inch thick aluminum alloy plate.

3.4.1 Rotation of output shaft. The shaft rotation, as viewed from the shaft end, shall be in a counterclockwise (CCW) direction with positive voltage applied to plus(+) terminals of the filter. Reversing lead polarity shall reverse shaft rotation (see 4.6.3).

3.4.2 No load speed. The no load speed of the motor shall be no more than 36 revolutions per minute (rpm) (see 4.6.4).

3.4.3 Zero torque current. The zero torque current of the motor shall be no more than 0.5 amperes (A) dc (see 4.6.5).

3.4.4 Speed and current at 640 ounce inch (oz-in). With the torque at 640 oz-in, the speed shall be no less than 22 rpm in either direction, and the current shall be no more than 1.5 A dc (see 4.6.6).

3.4.5 Speed and current at 950 oz-in. With the torque at 950 oz-in, the speed shall be no less than 15 rpm in either direction, and the current shall be no more than 2.5 A dc (see 4.6.7).

3.4.6 Stall torque and current. The stall torque shall be no less than 1590 oz-in and the stall current at stall torque shall be no more than 7.0 A dc. The motor shall stall without incurring damage, and performance after stall shall remain within specification limits (see 4.6.8).

3.4.7 Plug reversal. The motor performance shall remain within specified limits after application of rated voltage of polarity opposite the back electromotive force (emf) while rotating at any speed up to no-load speed. The speed in either direction shall not be less than that specified in 3.4.4 and 3.4.5. The following parameters shall apply to the plug reversal requirements (see 4.6.9).

- a. Resistance of switching circuit: 1.0 ohm (maximum) - excluding gear motor.

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- b. Voltage switching time: 100 milliseconds (ms) (maximum). Typical direction of switching sequence is CCW-OFF-clockwise (CW). "OFF" switch position connects both motor leads to ground potential during a minimum interval of 10 ms.

3.4.8 Duty cycle. The duty cycle shall be as follows (see 4.6.10):

- a. On for 2.0 seconds at 640 oz-in with rated voltage.
- b. Reverse drive polarity (plug reversed per 3.4.7) at rated voltage for a 2.0 second period with 640 oz-in load and rated voltage applied.
- c. Repeat steps (a) and (b) for 30 cycles.

Motor performance shall remain within specifications when the direction of drive is reversed (plug reversal) with rated voltage and 640 oz-in load applied.

3.4.9 Inertia (motor). Inertia shall be no more than 1.26 pound inch square second (lb-in s<sup>2</sup>) at the output shaft (see 4.6.11).

3.4.10 Operating voltage. The motor shall operate over the input voltage range of 18 to 30 V dc with the output as specified in 3.4.3 through 3.4.7, and 3.4.9 inclusive, in direct proportion to the voltage specified (see 4.6.12).

3.4.11 Insulation resistance. The motor shall have an insulation resistance of not less than 12.0 megohms initially, prior to installation of the electromagnetic interference (EMI) filter (see 4.6.13).

3.4.12 Dielectric withstanding voltage. The motor shall be capable of initially withstanding 500 V root mean square (rms), 60 Hertz (Hz) for 1 minute (or 600 V rms, 60 Hz for 1 second) between armature winding and frame, prior to installation of the EMI filter by the manufacturer. There shall be no breakdown or degradation of insulation (see 4.6.14).

3.4.13 Electromagnetic interference. The motor shall comply with emissions and susceptibility requirements of MIL-STD-461, Class A3 Electrical/Electronic Equipment (see 4.6.15).

3.4.14 Voltage transient. The motor shall withstand voltage transients as specified in MIL-STD-1275 in operating and non-operating modes (see 4.6.16).

3.4.15 Environmental.

3.4.15.1 Temperature.

3.4.15.1.1 High (operating). The motor shall meet the performance requirements contained herein when operating at a high ambient temperature of +140 degrees Fahrenheit (°F) [+60 degrees Celsius (°C)] (see 4.6.17.1.1).

3.4.15.1.2 High (nonoperating). The motor shall not be damaged nor performance impaired after extended exposure at a temperature of +160°F (+70°C) (see 4.6.17.1.2).

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3.4.15.1.3 Low (operating). The motor shall meet the performance requirements contained herein when operating at a low ambient temperature of -25°F (-32°C) (see 4.6.17.1.3).

3.4.15.1.4 Low (nonoperating). The motor shall not be damaged nor performance impaired after extended exposure to a temperature of -65°F (-54°C) (see 4.6.17.1.4).

3.4.15.2 Humidity (nonoperating). The motor shall not be damaged nor performance impaired after exposure to relative humidity ranges from up to 100 percent at 86°F (30°C) to not less than 2 percent at 155°F (68°C) (see 4.6.17.2).

3.4.15.3 Atmospheric pressure.

3.4.15.3.1 Operating. The motor shall meet the performance requirements contained herein when operating at an atmospheric pressure equivalent to an altitude of 8000 feet (see 4.6.17.3.1).

3.4.15.3.2 Nonoperating. The motor shall not be damaged nor performance impaired after exposure to an atmospheric pressure equivalent to an altitude of 40 000 feet (see 4.6.17.3.2).

3.4.15.4 Sand and dust.

3.4.15.4.1 Operating. The motor shall meet the performance requirements contained herein when operating in a sand and dust environment containing particle sizes of 0.0001 to 1.0 millimeter (mm) (see 4.6.17.4).

3.4.15.4.2 Nonoperating. The motor shall not be damaged nor performance impaired after exposure to sand and dust, particle size 0.0001 to 1.0 mm (see 4.6.17.4).

3.4.15.5 Salt fog (nonoperating). The motor shall not be damaged nor performance impaired after exposure to 3 grams salt per square meter per year (see 4.6.17.5).

3.4.15.6 Fungus. Only materials which are non-nutrients as identified by MIL-STD-454, requirement 4, shall be used where possible (see 4.6.17.6).

3.4.15.7 Vibration (nonoperating). The motor shall not be damaged nor performance impaired when subjected to simple harmonic motion in 3 mutually perpendicular directions in accordance with table I (see 4.6.17.7).

TABLE I. Vibration conditions.

Frequency (Hz)	Amplitude
5 to 6.2	0.5 inch double amplitude (da)
6.2 to 25	1 gravity force (g)
25 to 200	0.5 g

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3.4.15.8 Shock (nonoperating). The motor shall not be damaged nor performance impaired when subjected to half-sine wave shock impulses of not less than 25 g for 11 ms (see 4.6.17.8).

3.4.16 Lead strength. The unit shall not be damaged when subjected to a 5-pound pull in any direction for 1 minute at the motor or filter end (see 4.6.18).

3.5 Identification and marking. Each motor unit shall be marked in accordance with MIL-STD-130 and Drawing 12265908 (see 4.5.2 and 4.6.2).

3.6 Workmanship. Workmanship shall be in accordance with MIL-STD-454, requirement 9 (see 4.5.2 and 4.6.2).

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), 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 or witness 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.

4.1.2 Inspection equipment. Unless otherwise specified in the contract (see 6.2), the contractor is responsible for the provision and maintenance of all inspection equipment necessary to assure that supplies and services conform to contract requirements. Inspection equipment must be capable of repetitive measurements to an accuracy of 10 percent of the measurement tolerance. Calibration of inspection equipment shall be in accordance with MIL-STD-45662.

#### 4.2 Classification of inspection:

- a. First article inspection (see 4.4).
  1. Preproduction inspection (see 4.4.1).
  2. Initial production inspection (see 4.4.2).
- b. Quality conformance inspections (see 4.5).
  1. Examination (see 4.5.2).
  2. Tests (see 4.5.3).

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4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be conducted under the following conditions:

- a. Air temperature  $73 \pm 18^{\circ}\text{F}$  ( $23 \pm 10^{\circ}\text{C}$ )
- b. Barometric pressure  $28.5 \pm 2$  inches mercury (Hg) ( $725 \pm 50$  mm Hg)  
- 3 - 75
- c. Relative humidity  $50 \pm 30$  percent

4.4 First article inspection. First article inspection shall be performed on preproduction or initial production samples as specified herein. Approval of the first article sample by the Government shall not relieve the contractor of the obligation to supply motors that are fully representative of those inspected as a first article sample. Any changes or deviation of the production units from the first article sample shall be subject to the approval of the contracting officer.

4.4.1 Preproduction inspection. When specified (see 6.2), the preproduction sample shall consist of two motors. Preproduction inspection shall consist of inspection as specified in table II.

4.4.2 Initial production inspection. Unless otherwise specified (see 6.2), the Government shall select two motors, from the first twenty motors produced under the production contract for initial production inspection. Initial production motors shall be inspected as specified in table II.

4.4.3 First article inspection failure. Test item deficiencies during, or as a result of, the first article test, shall be cause for rejection of the items until evidence has been provided by the contractor that corrective action has been taken to eliminate the deficiency. Any deficiency found during, or as a result of the first article test, shall be evidence that all items already produced prior to completion of the first article test are similarly deficient unless contrary evidence satisfactory to the contracting officer is furnished by the contractor. Such deficiencies on all items shall be corrected by the contractor. The Government shall not accept products until first article testing is completed to the satisfaction of the Government.

4.5 Quality conformance inspection.

4.5.1 Sampling.

4.5.1.1 Lot formation. A lot shall consist of all motors, of one type and part number, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.5.1.2 Sampling for examination. Samples for quality conformance examination shall be selected in accordance with general inspection level II of MIL-STD-105. Before sampling may be initiated, the contractor shall establish by examination of at least 5 consecutively produced lots that the process average percent defective, as defined in MIL-STD-105, is not greater than the specified AQLs.



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4.5.2 Examination.

4.5.2.1 Acceptable quality level. Each sample selected in accordance with 4.5.1.2 shall be examined to determine conformance to the following acceptable quality levels (AQL's):

<u>Classification</u>	<u>AQL</u>
Major	1.0
Minor	2.5

4.5.2.2 Classification of defects. For examination purposes, defects shall be classified as specified in table III.

TABLE II. Classification of inspections.

Title	Requirement	Inspection	First article	Quality conformance	
				Examination	Tests
Materials and construction	3.2 thru 3.3.4	4.6.1	X		
Defects (see 4.5.2 and table III)	3.3, 3.5 and 3.6	4.6.2	X	X	
Rotation of output shaft	3.4.1	4.6.3	X		X
No load speed	3.4.2	4.6.4	X		X <u>1/</u>
Zero torque current	3.4.3	4.6.5	X		X <u>1/</u>
Speed and current at 640 oz-in	3.4.4	4.6.6	X		X
Speed and current at 950 oz-in	3.4.5	4.6.7	X		X <u>1/</u>
Stall torque and current	3.4.6	4.6.8	X		X
Plug reversal	3.4.7	4.6.9	X		X
Duty cycle	3.4.8	4.6.10	X		X <u>1/</u>
Inertia (motor)	3.4.9	4.6.11	X		X
Operating voltage	3.4.10	4.6.12	X		X
Insulation resistance	3.4.11	4.6.13	X		X
Dielectric withstanding voltage	3.4.12	4.6.14	X		X
Electromagnetic interference	3.4.13	4.6.15	X		X
Voltage transient	3.4.14	4.6.16	X		X
Temperature					
High (operating)	3.4.15.1.1	4.6.17.1.1	X		
High (nonoperating)	3.4.15.1.2	4.6.17.1.2	X		
Low (operating)	3.4.15.1.3	4.6.17.1.3	X		
Low (nonoperating)	3.4.15.1.4	4.6.17.1.4	X		
Humidity (nonoperating)	3.4.15.2	4.6.17.2	X		

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TABLE II. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance	
				Examination	Tests
Atmospheric pressure (operating)	3.4.15.3.1	4.6.17.3.1	X		
(nonoperating)	3.4.15.3.2	4.6.17.3.2	X		
Sand and dust (operating)	3.4.15.4.1	4.6.17.4	X		
(nonoperating)	3.4.15.4.2	4.6.17.4	X		
Salt fog (nonoperating)	3.4.15.5	4.6.17.5	X		
Fungus	3.4.15.6	4.6.17.6	X		
Vibration (nonoperating)	3.4.15.7	4.6.17.7	X		
Shock (nonoperating)	3.4.15.8	4.6.17.8	X		
Lead strength	3.4.16	4.6.18	X		

1/ Sample only in accordance with MIL-STD-105, Level II, AQL 1.5.

TABLE III. Classification of defects.

Category	Defect	Method of Inspection
Critical	NONE	
<u>Major</u>	<u>AQL 1.0% Defective</u>	
101	Dimensions affecting interchangeability, out of tolerance (see 3.3).	SIE <u>1/</u>
102	Improper identification marking (see 3.5).	Visual
103	Improper workmanship, affecting performance (see 3.6).	Visual
<u>Minor</u>	<u>AQL 2.5% Defective</u>	
201	Dimensions not affecting interchangeability, out of tolerance (see 3.3).	SIE
202	Improper workmanship affecting appearance (see 3.6).	Visual

1/ SIE = Standard Inspection Equipment

4.5.3 Tests. Unless otherwise specified herein, each assembly shall be subjected to the tests specified in table II.

4.5.4 Failure. Failure of any motor to pass any of the specified inspections shall be cause for the Government to refuse acceptance of the production quantity represented, until action taken by the contractor to correct defects and prevent recurrence has been approved by the Government.

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4.6 Methods of inspection.

4.6.1 Materials and construction. Conformance to 3.2.1 through 3.3.4, shall be determined by inspection of contractor records providing proof or certification that design, construction, processing and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.6.2 Defects. Conformance to 3.3, 3.5 and 3.6 shall be determined by examination for the defects listed in table III. Examination shall be visual, tactile, or by measurement with standard inspection equipment.

4.6.3 Rotation of output shaft. To determine conformance to 3.4.1, the motor shaft shall rotate in a counterclockwise direction when viewed from the shaft end with positive voltage applied to the + (positive) terminal of the filter and negative voltage applied to the - (negative) terminal of the filter. Reverse lead polarity stated above and verify clockwise shaft rotation.

4.6.4 No load speed. To determine conformance to 3.4.2, the motor output shaft speed measured with no load applied shall be no more than 36 rpm in both directions of rotation.

4.6.5 Zero torque current. To determine conformance to 3.4.3, the current drawn by the motor under the condition of no load applied to the output shaft, shall be measured and shall not exceed 0.5 A dc.

4.6.6 Speed and current at 640 oz-in. To determine conformance to 3.4.4, the motor output shaft shall be connected to a loading device such as a dynamometer and a speed-indicating device such as a tachometer. The loading shall then be adjusted to not less than 640 oz-in, and the resultant speed and current measured for each direction of rotation. The speed shall be no less than 22 rpm, and the current shall be no more than 1.5 A dc.

4.6.7 Speed and current at 950 oz-in. To determine conformance to 3.4.5, the motor output shaft shall be connected to a loading device such as a dynamometer and a speed-indicating device such as a tachometer. The loading shall then be adjusted to not less than 950 oz-in, and the resultant speed and current measured for each direction of rotation. The speed shall be no less than 15 rpm and the current shall be no more than 2.5 A dc.

4.6.8 Stall torque and current. To determine conformance to 3.4.6, the motor output shaft shall be connected to a loading device such as a dynamometer and the starting current recorded by oscilloscope. With the motor energized at 24.0 V dc, the stall torque shall be no less than 1590 oz-in and the stall current at stall torque shall be no more than 7.0 A dc. The motor shall not be damaged nor performance impaired after the stall.

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4.6.9 Plug reversal. To determine conformance to 3.4.7, the motor shall be connected to a power source through a switching circuit as described by 3.4.7, a and b. The motor shall then be energized at  $30.0 \pm 0.1$  V dc and with the output shaft rotating at not less than 22 nor more than 36 rpm, the motor shall be plug reversed by applying a polarity opposite the back emf described in 3.4.7. At the conclusion of the plug reversal test, the motor shall meet 4.6.6 and 4.6.7.

4.6.10 Duty cycle. To determine conformance to 3.4.8, the motor shall be connected to a power source through a switching circuit as described by 3.4.7, a and b. The motor shall then be subjected to the following:

- a. On for 2.0 seconds at not less than 640 oz-in with  $24.0 \pm 0.5$  V dc applied.
- b. Reverse drive polarity (plug reverse per 4.6.9) with  $24.0 \pm 0.5$  V dc applied for a 2-second period at not less than 640 oz-in.
- c. Repeat steps a and b for 30 cycles. At the conclusion of the duty cycle test, the motor shall meet 4.6.6 and 4.6.7.

4.6.11 Inertia. To determine conformance to 3.4.9, the inertia shall be no more than  $1.26 \text{ lb-in s}^2$  when measured at the output shaft.

4.6.12 Operating voltage. When specified (see 6.2), tests of 4.6.4 through 4.6.8 and 4.6.10 shall be repeated except the input voltage shall be  $18.0 \pm 0.1$  V dc followed by test input voltage of  $30.0 \pm 1$  V dc. Motor performance shall be in accordance with 3.4.10.

4.6.13 Insulation resistance. To determine conformance to 3.4.11, the insulation resistance of the motor shall be measured prior to installation of the EMI filter. Insulation resistance shall be in accordance with MIL-STD-202, method 302, condition B, conducted at 500 V dc measured between winding and frame. Insulation resistance shall be not less than 12 megohms initially.

4.6.14 Dielectric withstanding voltage. To determine conformance to 3.4.12, prior to installation of the EMI filter, the motor shall be subjected initially to dielectric withstanding voltage in accordance with MIL-STD-202, method 301. The voltage shall be 500 V rms, 60 Hz for 1 minute or 600 V rms, 60 Hz applied for 1 second between winding and frame. There shall be no breakdown or degradation of insulation.

4.6.15 Electromagnetic interference. To determine conformance to 3.4.13, the motor shall be tested in accordance with methods CE04, CE05, and RE02 of MIL-STD-462, Notice 3.

4.6.16 Voltage transient. To determine conformance to 3.4.14, the motor shall be subjected to the voltage transients specified in MIL-STD-1275.

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4.6.17 Environmental.4.6.17.1 Temperature.

4.6.17.1.1 High (operating). To determine conformance to 3.4.15.1.1, the motor shall be tested in accordance with MIL-STD-810D, method 501.2, procedure II, except temperature shall be raised to +140°F (+60°C).

4.6.17.1.2 High (nonoperating). To determine conformance to 3.4.15.1.2, the motor shall be tested in accordance with MIL-STD-810D, method 501.2, procedure I, except temperature shall be raised to +160°F (+70°C).

4.6.17.1.3 Low (operating). To determine conformance to 3.4.15.1.3, the motor shall be tested in accordance with MIL-STD-810D, method 502.2, procedure II, except temperature shall be lowered to -25°F (-32°C).

4.6.17.1.4 Low (nonoperating). To determine conformance to 3.4.15.1.4, the motor shall be tested in accordance with MIL-STD-810D, method 502.2, procedure I, except temperature shall be lowered to -65°F (-54°C).

4.6.17.2 Humidity (nonoperating). To determine conformance to 3.4.15.2, the motor shall be tested in accordance with MIL-STD-810D, method 507.2, procedure I.

4.6.17.3 Atmospheric pressure.

4.6.17.3.1 Operating. To determine conformance to 3.4.15.3.1, the motor shall be tested by placing in a chamber and stabilizing at a temperature of -125°F (+52°C) and a pressure equivalent to an altitude of 3000 feet for not less than 2 hours before the start of the test. After not less than 6 hours in this stabilized condition, and with no change in temperature or pressure, the test article shall meet functional test.

4.6.17.3.2 Nonoperating. To determine conformance to 3.4.15.3.2, the motor shall be tested in accordance with MIL-STD-810D, method 500.2, procedure I including test for pressure equivalent to 40 000 feet.

4.6.17.4 Sand and dust. To determine conformance to 3.4.15.4, the motor shall be tested in accordance with MIL-STD-810D, method 510.2, procedure I, except temperature during step 5 shall be limited to +140°F (+60°C).

4.6.17.5 Salt fog (nonoperating). To determine conformance to 3.4.15.5, the motor shall be tested in accordance with MIL-STD-810D, method 509.2, procedure I.

4.6.17.6 Fungus. To determine conformance to 3.4.15.6, the motor shall be tested in accordance with MIL-STD-810D, method 508.3. In the event that only materials which are non-nutrients as identified by MIL-STD-454, requirement 4 have been utilized, certification by the manufacturer that only non-nutrients have been utilized will be acceptable in lieu of testing.

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4.6.17.7 Vibration (nonoperating). To determine conformance to 3.4.15.7, the motor shall be tested in accordance with MIL-STD-202, method 204, condition A, except that the frequency range is 5 to 200 Hz and amplitudes conform to table I. There shall be no damage or performance degradation as a result of this test.

4.6.17.8 Shock (nonoperating). To determine conformance to 3.4.15.8, the motor shall be tested in accordance with MIL-STD-202, method 213B, condition J, except 25 g's for 11 ms as specified therein, shall apply. There shall be no damage or degradation as a result of this test.

4.6.18 Lead strength. To determine conformance to 3.4.16, the motor or filter end shall be attached to a spring scale and a force of 5 pounds shall be applied for 1 minute. The test is to be applied at random directions with respect to the exit location of the wire from the motor and the attachment of wire to the filter.

## 5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking for the desired level of protection shall be in accordance with the applicable packaging standard or packaging data sheet specified by the contracting authority (see 6.2).

## 6. NOTES

6.1 Intended use. The motor assembly is intended to be used primarily on a ground military vehicle to operate the Remote Arming Device (RAD).

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. If first article samples are not required (see 3.1).
- c. If responsibility for inspection shall be other than as specified (see 4.1).
- d. If responsibility for inspection equipment shall be other than as specified (see 4.1.2).
- e. If inspection conditions shall be other than as specified (see 4.3).
- f. If preproduction inspection is required (see 4.4.1).
- g. If initial production inspection is not required (see 4.4.2).
- h. If specific tests are required (see 4.6.12).
- i. Applicable levels of preservation, packaging, packing, and marking (see 5.1).

6.3 Recycled materials. Use of recycled materials which meet the requirements of applicable material specifications without jeopardizing intended use of the item shall be encouraged (see 3.2).

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6.4 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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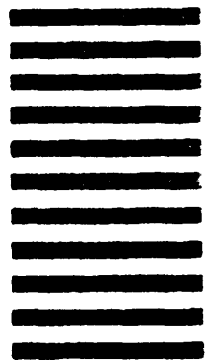
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a. Paragraph Number and Wording.	
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