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MILITARY SPECIFICATION

DISTRIBUTOR, IGNITION SYSTEM: INTEGRAL
COIL, WATERPROOF 24 VOLT

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

1. SCOPE

1.1 Scope. This specification covers waterproof ignition distributor assemblies with integral ignition coil and authorized repair parts. These ignition distributor assemblies are designed to operate in 24 volt (V) direct current (dc) electrical systems and are of breaker point or breakerless design. Ignition distributor assemblies shall be referred to herein as "distributors".

1.2 Classification. Distributors shall be classified by type and class as listed below (see 6.2 and 6.4).

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 2920

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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Classification	Description	Military standard/ Drawing no.
Type I	Left hand (counterclockwise) rotation viewing drive end.	7355734 7762671 7762685 12259526
Type II	Right hand (clockwise) rotation viewing drive end.	7353276 7355596 7358569 7374377 10863489
Class 1 <u>1/</u>	Breaker point design	
Class 2 <u>1/</u>	Breakerless design	

1/ see 6.4.3 and 6.4.4

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS
MILITARY

- | | |
|-------------|--|
| MIL-P-514 | - Plate, Identification, Instruction and Marking; Blank. |
| MIL-F-13927 | - Fungus Resistance Test; Automotive Components. |

STANDARDS
FEDERAL

- | | |
|-------------|---|
| FED-STD-H28 | - Screw-Thread Standards for Federal Services, Section 2, Unified Inch-Screw Threads - UN and UNR Thread Forms. |
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MILITARY

- | | |
|-------------|--|
| MIL-STD-105 | - Sampling Procedures and Tables for Inspection by Attributes. |
| MYL-STD-130 | - Identification Marking of US Military Property. |

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MIL-STD-202	- Test Methods for Electronic and Electrical Component Parts.
MIL-STD-461	- Electromagnetic Emission and Susceptability Requirements for the Control of Electromagnetic Interference.
MIL-STD-462	- Electromagnetic Interference Characteristics, Measurement of.
MIL-STD-1184	- Electrical Components for Automotive Vehicles, Waterproofness Tests.
MIL-STD-45662	- Calibration Systems Requirements.
MS35206	- Screw, Machine - Pan Head, Cross-Recessed Carbon Steel, Cadmium Plated, UNC-2A(IN/MM).

2.1.2 Government drawings. The following Government drawings 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

5701239	- Ignition Distributor Contact Set.
7348578	- Ignition Distributor Rotor.
7355734	- Ignition Distributor Assembly.
7353276	- Ignition Distributor Assembly.
7355596	- Ignition Distributor Assembly.
7358569	- Ignition Distributor Assembly.
7374377	- Ignition Distributor Assembly.
7374880	- Ignition Distributor Cap.
7374377	- Ignition Distributor Cap.
7374883	- Ignition Distributor Cap Cover.
7375373	- Ignition Distributor Cap Cover.
7539588	- Ignition Distributor Rotor.
7727531	- Gap, Sparking.
7762671	- Ignition Distributor Assembly.
7762685	- Ignition Distributor Assembly.
8722526	- Ignition Distributor Cap.
8722527	- Ignition Distributor Rotor.
10863489	- Ignition Distributor Assembly.
11640924	- Ignition Distributor Contact Set.
11663066	- Ignition Distributor Coil.
12259526	- Ignition Distributor Assembly.

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

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117

- Salt-Spray (Fog) Testing.

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article.

3.1.1 Distributors. Unless otherwise specified (see 6.2), the contractor shall furnish distributors 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 distributors to be furnished to the Government. All subsequent units delivered to the Government shall conform to these samples in all of their pertinent physical and performance attributes.

3.1.2 Authorized repair parts. Unless otherwise specified (see 6.2), the contractor shall furnish authorized repair parts (see table I) 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 distributors to be furnished to the Government. All subsequent units delivered to the Government shall conform to these samples in all of their pertinent physical and performance attributes.

3.1.2.1 Separate repair parts. Repair parts submitted separately for first article inspection shall be individually assembled with all other parts necessary to form a complete distributor assembly.

3.1.2.2 Assembled repair parts. Repair parts contained within distributor assemblies, which have successfully met first article requirements, shall also have successfully completed first article inspection.

TABLE I. Authorized repair parts.

Drawing/standard	Title
5701239	Ignition distributor contact set.
7348578	Ignition distributor rotor.
7374880	Ignition distributor cap.
7374377	Ignition distributor cap.
7374883	Ignition distributor cap cover.
7375373	Ignition distributor cap cover.
7539588	Ignition distributor rotor.
1121531	Gap, sparking
8722526	Ignition distributor cap.
87225271	Ignition distributor rotor.
11640924	Ignition distributor contact set.
11663066	Ignition distributor coil.
MS35206-241	Screw, machine-pan head, cross-recessed, carbon steel, cadmium plated, UNC-2A

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards, and drawings (see 4.8.1).

3.2.1 Recycled, virgin and reclaimed materials. There are no requirements for the exclusive use of virgin materials. The use of recycled or reclaimed (recovered) materials is acceptable provided that all other requirements of this specification are met (see 4.8.1 and 6.4.5).

3.3 Design and construction. Distributors shall conform to applicable drawings and standards for type and class (see 1.2). Authorized repair parts (ARP) shall conform to the form and dimensions specified on the drawings listed in table I (see 4.8.1, 4.8.2 and 6.2).

3.3.1 Interchangeability. All distributor assemblies and authorized repair parts shall be physically and functionally interchangeable with all other products of the same part number (see 4.8.1 and 4.8.2).

3.3.2 Housing. Distributor housing shall be so constructed as to be electrically continuous (see 4.8.2).

3.3.2.1 Coil-to-distributor lead. When specified (see 6.2), provision shall be made to permit connection to coil-to-distributor lead for testing purposes (see 4.8.1 and 4.8.2).

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3.3.3 Timing: initial setting. Timing of distributor shall be accomplished by rotation of the complete distributor assembly in its mounting (see 4.8.2).

3.3.3.1 Advance and retard. Spark advance mechanism shall be centrifugal. The centrifugal spark advance mechanisms shall continuously adjust timing of voltage output at the spark gap in conformance to the advance curve specified on applicable drawings or military standards (MS) (see 4.8.1 and 4.8.2).

3.3.4 Drive arrangement. Distributor shaft speed shall be one-half crankshaft speed. Drive end of the shaft shall be designed so that mating parts shall not be assembled 180 degrees ($^{\circ}$) out of line (see 4.8.2).

3.3.5 Ventilation. Provision shall be made for ventilation as specified on applicable drawing or MS (see 4.8.1 and 4.8.2).

3.3.6 Lubrication. The breaker cam follower shall be designed so that no additional lubrication shall be required when operation time is less than 100 hours. The rotor shaft bearing shall be designed so that no additional lubrication shall be required when operation time for class 1 distributor is less than 600 hours and when operation of class 2 distributor is less than 1500 hours (see 4.8.2).

3.3.7 Threaded parts. Screw threads of the form, number per inch, and class specified on the applicable drawing or MS shall be in accordance with FED-STD-H28/2 (see 4.8.1 and 4.8.2).

3.4 Performance.

3.4.1 Voltage output. The distributor shall produce no less than minimum voltage output at each output terminal under operating conditions specified in table II. Variation of output voltage from output terminal to output terminal shall be no more than 10 percent (%). When operating, the distributor shall produce no less than 6000 V dc at output terminals. The distributor shall then be operated for 3 hours at 300 revolutions per minute (rpm) and 3 hours at 1800 rpm. Thereafter, the distributor cap shall be examined and there shall be no evidence of cap and rotor interference (see 4.8.3).

TABLE II. Voltage output.

Output	Conditions			
	Voltage output, minimum kilovolts (kV)			
	Ambient air temperature 77 \pm 15°F 1/		Ambient air temperature 200 \pm 10°F	
Distributor shaft speed (rpm)	18 V input	30 V input	18 V input	30 V input
	300 \pm 10 1800 \pm 25	14 kV 12 kV	17 kV 17 kV	10 kV 10 kV

1/ °F - degrees Fahrenheit

3.4.1.1 Class 2 low input voltage. The class 2 distributor shall withstand operation at any steady state system input voltage from zero to 18 V dc, of correct polarity, without impairing performance when operated as specified in 3.4.1 (see 4.8.3.1).

3.4.1.2 Class 2 high input voltage. The class 2 distributor shall withstand operation for one hour at steady state system input voltage of not less than 30 V dc and not more than 40 V dc, of correct polarity, without impairing performance when operated as specified in 3.4.1 (see 4.8.3.2).

3.4.2 Timing performance. The distributor shall provide voltage output at each output terminal, in turn, in regular rotary sequence. Peak voltage output shall occur within $\pm 1^\circ$ of rotation for each point of actuation (see 6.4.1) on the distributor shaft (see 4.8.4).

3.4.3 Dielectric strength. The insulation materials shall exhibit no loosening, cracking, chafing, charring, burning, smoking, nor reduction in dielectric strength after distributor assembly operation, with two output leads connected to ground and remaining leads connected to the spark gap set at eight millimeters, with 32 V dc input. Subsequently, the distributor assembly shall conform to 3.4.1 (see 4.8.5).

3.4.4 Endurance. The distributor shall be operated and shall conform to either 3.4.4.1 or 3.4.4.2 as applicable (see 4.8.6).

3.4.4.1 Class 1 distributor assembly. The class 1 distributor, including distributor shaft to crankshaft coupling, shall operate for 600 hours with no maintenance except resetting of breaker points at 100 hour intervals, and lubrication of breaker cam, breaker lever pivot and felt wick under rotor. Subsequently, the distributor assembly shall operate as specified in 3.4.1 and 3.4.2.

3.4.4.2 Class 2 distributor assembly. The class 2 distributor, including distributor shaft to crankshaft coupling, shall operate for 1500 hours with no maintenance. Subsequently, the distributor assembly shall operate as specified in 3.4.1 and 3.4.2.

3.4.5 Polarity, class 2 distributor. The class 2 distributor, shall operate in a negatively grounded system, and shall be inoperable during reversed polarity. Subsequent to applications of reversed polarity, the distributor assembly shall operate as specified in 3.4.1 (see 4.8.7).

3.4.6 Transient voltage. The distributor (class 2) shall undergo input of correctly polarized 240 V dc transient in 200°F ambient air temperature. Subsequently, the distributor assembly shall operate as specified in 3.4.1 (see 4.8.8).

3.4.7 Environment.

3.4.7.1 Waterproofness. The distributor shall undergo, and shall pass, waterproofness test procedure specified for type I, class 1 components in MIL-STD-1184 (see 4.8.9).

3.4.7.2 Corrosion resistance. The distributor shall be tested for a period of 200 hours in accordance with ASTM B117. Subsequently, the distributor shall operate as specified in 3.4.1 and shall conform to 3.5 (see 4.8.10).

3.4.7.3 Fungus resistance. To determine resistance to fungus growth, the distributor shall be tested in accordance with method B, class 1 of MIL-F-13927. Subsequently, the distributor shall operate as specified in 3.4.1 and conform to 3.5 (see 4.8.11).

3.4.7.4 Vibration resistance. The distributor shall be tested to determine that mechanical parts shall not be affected by vibration. The test shall be conducted under electrical-load for 2 hours in each of three mutually perpendicular axes. The assembly shall operate as specified in 3.4.1 after completion of vibration testing (see 4.8.12).

3.4.7.4.1 Pitch-filled or oil-filled coil. Distributors with pitch or oil-filled coils shall withstand 72 hours of vibration as specified in 3.4.7.4, and subsequently shall operate as specified in 3.4.1 (see 4.8.12.1).

3.4.7.4.2 Molded or potted coil. Distributors with molded or potted coils shall withstand 96 hours of vibration as specified in 3.4.7.4 and subsequently shall operate as specified in 3.4.1 (see 4.8.12.2).

3.4.7.4.3 Coil mounting. Coil mounting tabs, screws, and clamp shall not loosen, crack, or break during 8 hours of vibration of 20 gravity units (g) input while retaining coil as in 6.1 (see 4.8.13).

3.4.7.5 Shock resistance. To determine resistance to shock during operation, the distributor shall be mounted and subjected to 18 half-sine waveform pulses that shall have a duration of 11 milliseconds (ms) and obtain a peak value of 50 g. Subsequently, the assembly shall operate as specified in 3.4.1 (see 4.8.14).

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3.4.7.6 Electromagnetic interference. The distributor shall conform to requirements of classes A3 and C1 of MIL-STD-461 for tactical and combat vehicle components (see 4.8.15).

3.4.7.6.1 Resistor-suppressors. Resistor-suppressors, in the output towers of the distributor cap, shall provide the following resistance to high peak voltage pulses specified in 3.4.4 (see 4.8.15.1):

<u>Initial value (ohms)</u>	<u>Value (ohms) after cycling</u>
3750-6250	3750-7500

3.4.7.7 High temperature operation. The distributor shall operate as specified in 3.4.1 at $200 \pm 10^\circ\text{F}$ ambient air temperature (see 4.8.16).

3.4.7.8 Low temperature operation. The distributor shall operate as specified in 3.4.1 after the distributor assembly temperature has been stabilized at minus $(-)$ $65 \pm 5^\circ\text{F}$ (see 4.8.17).

3.4.7.9 High temperature stall. The distributor shall be operated for 6 hours with 24 V dc applied to the coil primary in an ambient air temperature of $160 \pm 5^\circ\text{F}$. The distributor shall then operate as specified in 3.4.1 and shall exhibit no damage to the coil or ballast resistor (see 4.8.18).

3.4.7.10 Low temperature stall. The distributor shall be operated for 6 hours with 24 V dc applied to coil primary in an ambient air temperature of $-65 \pm 5^\circ\text{F}$. The distributor shall then operate as specified in 3.4.1 and shall exhibit no damage to coil or ballast resistor (see 4.8.19).

3.5 Finish. The distributor shall exhibit no blistering, chipping, peeling, or rust after undergoing tests (see 4.8.2).

3.6 Marking. A nameplate conforming to type I, style II, of MIL-P-514 shall be affixed to the distributor housing, as shown on the applicable drawing, and shall include the following minimum information (see 4.8.1 and 4.8.2):

Ignition system
24 Volts
Army part number
US
National stock number
Manufacturer's part number
Manufacturer's serial number
Manufacturer's identification (name or code)
Direction of rotation (see 3.6.1).

3.6.1 Direction of rotation. Direction of rotation shall be indicated by an arrow located on nameplate.

3.6.2 Repair parts. Repair parts shall be marked in accordance with MIL-STD-130.

3.7 Workmanship. Workmanship shall be such as to assure a product free of burrs, rust, scatches, sharp edges, and chips (see 4.8.2).

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 inspections 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% of the measurement tolerance. Calibration of inspection equipment shall be in accordance with MIL-STD-45662.

4.2 Classification of inspections:

- a. First article inspection (see 4.4).
- b. Quality conformance inspections (see 4.5).
 1. Examination (see 4.5.2).
 2. Tests (see 4.5.3).
- c. Control tests (see 4.6).

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

- a. Air temperature $77 \pm 15^{\circ}\text{F}$
- b. Barometric pressure 725 ± 50 millimeter (mm) mercury
- 75
- c. Relative humidity $50 \pm 30\%$

4.4 First article inspection. Unless otherwise specified (see 6.2), the Government shall select seven distributors of each type and class produced under the production contract for first article inspection. First article samples shall be inspected as specified in table III. Approval of the first article sample by the Government shall not relieve the contractor of his obligation to supply distributors 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 Authorized repair parts. Unless otherwise specified (see 6.2), the Government shall select the following quantities of authorized repair parts (ARP) produced under the production contract for first article inspection:

<u>Part</u>	<u>Number of parts</u>
Cap	3
Cap cover	1
Coil	5
Contact set	2
resistor	1
rotor	3

First article inspection shall consist of a comparison examination of materials, dimensions and finish in accordance with applicable MS or drawings. Then each part shall be assembled in a distributor assembly that has successfully completed first article inspections as specified in table III. The installed ARP shall then be inspected for first article as a complete assembly in accordance with table III. Approval of the first article sample by the Government shall not relieve the contractor of his obligation to supply ARPs 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.

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TABLE III. Classification of inspections.

Title	Requirement	Inspection	First article	Quality conformance			Control
				Examination	Tests		
					1/	2/	
Materials and construction	3.2 thru 3.3.1, 3.3.2.1, 3.3.3.1, 3.3.5, 3.3.7, and 3.6	4.8.1	X				
Defects (see table IV)	3.3 thru 3.3.7, 3.5 thru 3.7	4.8.2	X	X			
Voltage output	3.4.1	4.8.3	X		X	X	X
Low input voltage	3.4.1.1	4.8.3.1	X				
High input voltage	3.4.1.2	4.8.3.2	X				
Timing performance	3.4.2	4.8.4	X		X		X
Dielectric strength	3.4.3	4.8.5	X		X	X	X
Endurance	3.4.4	4.8.6	X				
Polarity	3.4.5	4.8.7	X				
Transient voltage	3.4.6	4.8.8	X				
Saline submersion	3.4.7.1	4.8.9.1	X		X	X	X
Freshwater submersion	3.4.7.1	4.8.9.2	X		X	X	X
Corrosion resistance	3.4.7.2	4.8.10	X				
Fungus resistance	3.4.7.3	4.8.11	X				
Vibration resistance	3.4.7.4	4.8.12	X				
Pitch-filled or oil-filled coil	3.4.7.4.1	4.8.12.1	X				
Molded or potted coil	3.4.7.4.2	4.8.12.2	X				
Coil mounting	3.4.7.4.3	4.8.13	X				
Shock resistance	3.4.7.5	4.8.14	X				
Electromagnetic interference	3.4.7.6	4.8.15	X				
Resistor-suppressor	3.4.7.6.1	4.8.15.1	X			X	
High temperature operation	3.4.7.7	4.8.16	X				

TABLE III. Classification of inspections - Continued.

Title	Requirement	Inspection	First article	Quality conformance		Control
				Exam- nation	Tests	
					1/ 2/	
Low temperature operation	3.4.7.8	4.8.17	X			
High temperature stall	3.4.7.9	4.8.18	X			
Low temperature stall	3.4.7.10	4.8.19	X			

1/ Distributor assemblies

2/ Repair parts

4.4.2 First article inspection failure. Deficiencies found during, or as a result of, first article inspection shall be cause for rejection of the first article sample 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, first article inspection shall be evidence that all items already produced prior to completion of first article inspection 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 inspection is completed to the satisfaction of the Government.

4.5 Quality conformance inspection.

4.5.1 Sampling.

4.5.1.1 Lot formation. An inspection lot shall consist of all the components, or distributors 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.

4.5.1.3 Sampling for quality conformance. Samples for quality conformance tests shall be selected in accordance with level S-3 of MIL-STD-105.

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).

<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 listed in table IV.

TABLE IV. Classification of defects.

<u>Category</u>	<u>Defect</u>	<u>Method of examination</u>
Critical	None	
<u>Major</u>	<u>AQL 1.0% Defective</u>	
101	Nonconformance of design and construction (see 3.3, 3.3.2 thru 3.3.6).	Visual and SIE 1/
102	Incorrect dimensions affecting interchangeability (see 3.3, 3.3.1 and 3.3.7).	Visual and SIE
103	Faulty workmanship affecting performance (see 3.7).	Visual and SIE
<u>Minor</u>	<u>AQL 2.5% Defective</u>	
201	Dimensions not affecting interchangeability not within tolerance (see 3.3).	Visual and SIE
202	Improper marking (see 3.6).	Visual
203	Faulty workmanship affecting appearance (see 3.5 and 3.7).	Visual

1/ SIE = Standard Inspection Equipment.

4.5.2.3 Unclassified defects. All unclassified defects having no bearing on function, safety, interchangeability, or life, but which are considered departures from good workmanship, shall be noted in writing. Workmanship defects falling within this category and recurring in five consecutive lots, or ten lots or more within a 30 day period, shall be added to the minor defects with no increase in AQL.

4.5.3 Tests. All samples of distributor assemblies, selected in accordance with 4.5.1.3, shall be examined for the defects specified in table IV, and subjected to tests specified in table V, in order listed, using an AQL of 6.5 on the basis of % defective.

TABLE V. Order of quality conformance testing.

Requirement	Test
3.4.3	4.8.5 Dielectric strength
3.4.1	4.8.3 Voltage output
3.4.7.1	4.8.9 Waterproofness
3.4.1	4.8.3 Voltage output
3.4.2	4.8.4 Timing
3.4.1	4.8.3 Voltage output

4.5.3.1 Authorized repair parts. Samples of repair parts (see table I) selected in accordance with 4.5.1.3, shall be examined for the defects specified in table IV, and subjected to tests specified in table VI in order listed, using an AQL of 6.5 on the basis of % defective. Repair parts shall be substituted (see 3.1.2.1) in distributor assemblies that have previously passed inspection specified herein.

TABLE VI. Order of quality conformance testing - repair parts.

Repair part	Requirement	Test
Cap	3.4.7.6.1	4.8.15.1 Resistor-suppressor
	3.4.1	4.8.3 Voltage output
	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output
	3.4.7.6.1	4.8.15.1 Resistor-suppressor
Coil	3.4.1	4.8.3 Voltage output
	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output
Cover	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output
	3.4.7.1	4.8.9 Waterproofness
	3.4.1	4.8.3 Voltage output
Point set	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output
Resistor	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output
Rotor	3.4.7.6.1	4.8.15.1 Resistor-suppressor (if resistor is part of rotor)
	3.4.3	4.8.5 Dielectric strength
	3.4.1	4.8.3 Voltage output

4.5.4 Failure. Failure of any distributor to pass any of the specified inspections or failure to meet inspection AQL levels, as applicable, 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.

4.6 Control tests. Control test samples shall be identified as to production period and shall undergo tests specified in table VII, in order listed. Repair parts shall be substituted (see table I) in distributor assemblies that have previously passed inspections specified herein.

4.6.1 Sampling - control testing. Samples for control testing shall be selected from production lots which have passed the quality conformance examination specified in 4.5.2. Control test samples shall be selected at the rate of 1 out of each 200 units produced, except that not less than 1, and not more than 2, shall be selected and tested in any 30-day period. Samples selected shall not have previously been subjected to quality conformance testing.

TABLE VII. Order of control testing.

Requirement	Test
3.4.1	4.8.3 Voltage output
3.4.2	4.8.4 Timing
3.4.1	4.8.3 Voltage output
3.4.3	4.8.5 Dielectric strength
3.4.1	4.8.3 Voltage output
3.4.7.1	4.8.9 Waterproofness <u>1/</u>

1/ Coil, point set, resistor, or rotor, when being tested as repair parts, need not be subjected to waterproofness test.

4.7 Failure. Failure of a control test sample to pass any specified examination or test may be cause for the Government to refuse to accept subsequent lots until it has been proved to the satisfaction of the Government that the faults revealed by the tests have been corrected.

4.8 Methods of inspection.

4.8.1 Materials and construction. Conformance to 3.2 through 3.3.1, 3.3.2.1, 3.3.3.1, 3.3.5 and 3.3.7 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.

4.8.2 Defects. Conformance to 3.3 through 3.3.7 and 3.5 through 3.7 shall be determined by examination for the defects listed in table IV. Examination shall be visual, tactile, or by measurement with standard inspection equipment.

4.8.3 Voltage output. To determine conformance to 3.4.1, the distributor assembly shall be electrically connected and mechanically mounted in an apparatus to simulate operation. Each secondary lead shall be shunted through load capacitance of 150 ± 10 picofarads (pF). One secondary lead shall be connected to a peak voltage measuring device. Remaining secondary leads shall be connected to spark gap as shown on Drawing 7727531. Spark gap shall be 3 mm. The distributor assembly shall be operated at each input speed and voltage specified in table II. The distributor assembly shall be operated for 3 minutes before taking each measurement. Measurement of output voltage shall be taken at each lead, and recorded. The lowest voltage measured at any secondary lead shall be considered voltage output at that input speed and voltage. Thereafter, total capacitance of each secondary lead shall be adjusted to 150 ± 10 pF with resistance ungrounded. With 250,000 ohms \pm 25,000 ohms shunted across the secondary lead, and with 30 V dc and 1800 rpm input, the output voltage shall be measured and recorded at each secondary lead. The lowest reading shall be considered voltage output for the distributor assembly. Subsequently, the distributor cap shall be removed and examined for interference with rotor. Satisfactory distributors, or repair parts, shall be reassembled and the test sequence resumed.

4.8.3.1 Low input voltage. To determine conformance to 3.4.1.1, a class 2 distributor, assembled, mounted and operating, shall be subjected to correctly polarized input voltages between zero and 18 V dc.

4.8.3.2 High input voltage. To determine conformance to 3.4.1.2, a class 2 distributor, assembled, mounted and operating, shall be subjected to correctly polarized input voltages between 30 and 40 V dc.

4.8.4 Timing performance. To determine conformance to 3.4.2 and 3.4.2.1, distributor assembly shall be operated through range of speeds, and timing of spark shall be measured and recorded for comparison with requirements.

4.8.5 Dielectric strength. To determine conformance to 3.4.3, each output lead of the distributor shall be connected to the spark gap, as shown on Drawing 7727531, set at 8 mm. No additional load shall be imposed on distributor. Input voltage shall be 32 ± 0.5 V dc. The distributor shall be operated at 200 rpm for 2 minutes. Two output leads adjacent to the coil shall then be connected to ground, remaining leads to 8 mm gaps, and tests repeated for 2 minutes. The distributor shall then be examined for evidence of breakdown of insulation materials.

4.8.6 Endurance. To determine conformance to 3.4.4, the distributor shall be electrically connected and mechanically mounted, as specified in 4.6.1, in ambient air temperature of $160 \pm 10^\circ\text{F}$. Spark gap, as shown on Drawing 7727531, shall be set at 3 mm and loaded with a capacitance of 150 ± 10 pF. With input of $28.5 \text{ V dc} \pm 0.5 \text{ V dc}$, the assembly shall be operated continuously through 300 cycles for class 1, or 750 cycles for class 2 of the following four phases as specified in table VIII (phases I - IV equal one cycle):

TABLE VIII. Endurance cycles.

Phase	Time (minutes)	Distributor shaft speed (rpm)
I	30	300
II	30	800
III	30	1500
IV	30	2000

After each 100 hours (50 cycles) of operation as specified above, the distributor shall undergo the following:

- a. Observe sparking regularity for 10 minutes at each specified speed.
- b. Observe output voltage at 300 rpm.
- c. Observe output voltage at 1800 rpm.
- d. Reset breaker points (class 1 only).
- e. Apply trace of approved high temperature grease on breaker cam (class 1 only).
- f. Apply one or two drops of approved light preservation oil on breaker lever pivot (class 1 only).
- g. Apply three or four drops of approved light preservation oil on felt wick under rotor (class 1 only).

4.8.7 Polarity - class 2 distributors. To determine conformance to 3.4.5, apply reverse polarity to the class 2 distributor, connected and operated as described in 4.8.3, except that no leads shall be connected to the peak voltage measuring device. A reverse polarity voltage of 30 V shall be applied 10 consecutive times for 1 minute, at 4-minute intervals.

4.8.8 Transient voltage. To determine conformance to 3.4.6, the class 2 distributor shall be tested at 200°F and subjected to a properly polarized transient voltage of 240 V dc above ground for 50 ± 5 ms duration. The voltage shall be applied to the input terminals of the distributor 10 consecutive times at 1-minute intervals.

4.8.9 Waterproofness.

4.8.9.1 Saline submersion. To determine conformance to 3.4.7.1 in salt water, the distributor shall be tested in accordance to a or b.

- a. The distributor assembly shall be subjected to procedures specified in method 100, procedure 1 of MIL-STD-1184. Pretest performance shall be recorded.
- b. The distributor assembly shall be tested as specified in 4.8.9.1a, except that air pressurization and evacuation may be applied directly to the interior of the distributor that has an access port for this purpose. The test chamber shall not be required. The distributor shall be submerged in an open tank of water. Distributors, of qualified design that do not include access ports, shall not be altered for the purpose of using this method.

4.8.9.2 Freshwater submersion. To determine conformance to 3.4.7.1 in freshwater, the distributor shall be tested in accordance with a or b.

- a. The distributor shall be subjected to procedures specified in method 100, procedure 5 of MIL-STD-1184. Pretest performance shall be recorded.
- b. The distributor shall be tested as specified in 4.8.9.2a, except that air pressurization may be applied directly to the interior of the distributor that has an access port for this purpose. The test chamber shall not be required. The distributor shall be submerged in open tank of water. Distributors of qualified design that do not include access ports, shall not be altered for the purpose of using this method.

4.8.10 Corrosion resistance. To determine conformance to 3.4.7.2, distributor shall be subjected to the procedure specified in method 101 of MIL-STD-202 for a total of 200 hours. Subsequently, the distributor shall be examined for conformance to 3.5.

4.8.11 Fungus resistance. To determine conformance to 3.4.7.3, distributor shall be subjected to the procedure specified in method B of MIL-F-13927 for a total of 90 days. Subsequently, the distributor shall be examined for conformance to 3.5.

4.8.12 Vibration resistance. To determine conformance to 3.4.7.4, the distributor shall be electrically connected and mechanically mounted in a suitable apparatus over the test frequency range and shall be capable of applying vibration in each of the three axes. Each distributor output lead shall be connected to the spark gap shown on Drawing 7727531 and set at 3 mm. With 28.5 V dc input and operating at 1200 rpm, the specimens shall be subjected to a simple harmonic motion having an amplitude of 0.03 inch (0.06 inch maximum total excursion), the frequency being varied uniformly between 10 and 55 hertz (Hz). The entire frequency range, from 10 to 55 Hz and return to 10 Hz, shall be traversed in approximately 1 minute.

4.8.12.1 Pitch-filled or oil-filled coil. To determine conformance to 3.4.7.4.1, the distributors with pitch-filled or oil-filled coil shall be subjected to 24 hours of specified vibration in each of three mutually perpendicular axes (total 72 hours).

4.8.12.2 Molded or potted coil. To determine conformance to 3.4.7.4.2, the distributors with molded or potted coil shall be tested in an ambient air temperature of $180 \pm 5^\circ\text{F}$. The distributors shall be subjected to 32 hours of specified vibration in each of three mutually perpendicular axes (total 96 hours). Testing shall be accomplished in two phases as follows:

- Phase I The distributor shall be subjected to a simple harmonic motion having an amplitude of 0.08 inches (0.16 inch maximum total excursion). Frequency shall be varied uniformly between 5 and 50 Hz. Frequency range shall be traversed in 1 minute, from 5 to 50 to 5 Hz.
- Phase II Amplitude shall be 0.02 inches (0.04 inch maximum total excursion). Frequency shall be varied uniformly between 50 and 100 Hz. Frequency range shall be traversed in 1 minute, from 50 to 100 to 50 Hz.

Plane of vibration and phase shall be changed every 8 hours during the 96-hour procedure.

4.8.13 Coil mounting. To determine conformance to 3.4.7.4.3, mount the ignition coil in the distributor base and secure with clamp assembly and screws. The distributor shall be assembled in the adapter and mounted in the vibrator fixture so that vibration is in the plane of centerlines of the distributor shaft and coil. Input vibration of 20 g shall be applied at the worst resonant frequency of the coil (between 60 and 150 Hz).

4.8.14 Shock resistance. To determine conformance to 3.4.7.5, the distributor assembly shall be subjected to the procedure as specified in condition A, method 213, MIL-STD-202.

4.8.15 Electromagnetic interference. To determine conformance to 3.4.7.6, class A3 distributor assemblies shall be subjected to test methods CE03 and RE02 as specified in MIL-STD-462. Class CI assemblies shall be subjected to test methods CE03 and RE05 of MIL-STD-462.

4.8.15.1 Resistor-suppressor. To determine conformance to 3.4.7.6.1, resistance values of resistor-suppressors shall be measured and recorded while undergoing short duration, high peak voltage pulses in accordance with the following:

Pulse repetition rate	4 ± 1 pulses per second
Pulse duration	100 microseconds or less
Pulse magnitude	5000 V dc \pm 250 V dc
Pulse rise time	10 to 15 microseconds

4.8.16 High temperature operation. To determine conformance to 3.4.7.7, the distributor assembly shall be installed in a chamber in which ambient air temperature is controlled at $200 \pm 10^{\circ}\text{F}$.

4.8.17 Low temperature operation. To determine conformance to 3.4.7.8, the distributor temperature shall be stabilized at $-65 \pm 5^{\circ}\text{F}$ for 24 hours, removed from the cold chamber and allowed to warm in air not more than 5 minutes. The distributor shall then be operated as specified in 3.4.1, except that only one lead shall be checked and values obtained shall be within 25% of the lowest value obtained in the first output test.

4.8.18 High temperature stall. To determine conformance to 3.4.7.9, the distributor, with breaker apparatus at point of actuation, shall be placed in a test chamber at $160 \pm 5^{\circ}\text{F}$. After the temperature has stabilized, the test chamber shall be shut off, including air circulating fans, and the chamber kept closed. The distributor shall immediately be energized from two 6TN batteries connected in series. The batteries shall be fully charged, in good condition, with electrolyte having a corrected specific gravity of $1.280 \pm .005$ at 77°F . The distributor shall be energized in this manner for 6 hours.

4.8.19 Low temperature stall. To determine conformance to 3.4.7.10, the distributor with breaker apparatus at the point of actuation, shall be placed in a test chamber at $-65^{\circ} \pm 5^{\circ}\text{F}$ for 24 hours. The distributor shall be energized from two 6TN batteries connected in series. The batteries shall be fully charged, in good condition, with electrolyte having a corrected specific gravity of $1.280 \pm .005$ at 77°F . The distributor shall be energized in this manner for 6 hours.

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 requirements specified by the contracting authority (see 6.2).

6. NOTES

6.1 Intended use. Distributors furnished under this specification are intended for use in military motor vehicles, or other military equipment requiring waterproof ignition systems.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and class (see 1:2).
- c. If first article inspection is not required (see 3.1).
- d. Applicable drawing or MS standard (see 3.3).
- e. Connection to the coil-to-distributor lead, when required (see 3.3.2.1).
- f. If responsibility for inspection shall be other than specified (see 4.1).

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- g. If responsibility for inspection equipment shall be other than specified (see 4.1.2).
- h. If inspection conditions shall be other than specified (see 4.3).
- i. If first article sample size shall be other than as specified (see 4.4.1 and 4.4.2).
- j. Selection of applicable level and packaging requirements (see 5.1).

6.3 Deletions. Appendix I has been deleted. Information formerly recorded there has been revised and incorporated in table I.

6.4 Definitions.

6.4.1 Point of actuation. Point of actuation is that point on the circumference of the distributor actuating device (see 6.4.2) at which current is actuated in the secondary circuit.

6.4.2 Distributor shaft actuating device. Distributor shaft actuating device is that portion of the distributor that operates the mechanism that actuates current in the secondary circuit.

6.4.3 Breaker point design. Distributors in which the secondary circuit is actuated by a switch (contact set) operated by a positive contact with the distributor actuating device (cam), whether or not the switch is in primary circuit shall be referred to as "breaker point design" (class 1).

6.4.4 Breakerless design. Distributors in which the secondary circuit actuation is induced by various non-mechanical means shall be referred to as "breakerless design" (class 2).

6.4.5 Recovered materials. "Recovered materials" means materials that have been collected or recovered from solid waste (see 6.4.6).

6.4.6 Solid waste. "Solid waste" means (a) any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and (b) other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. It does not include solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Clean Water Act, (33 U.S.C. 1342 et seq.) or source nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) (Source: Federal Acquisition Regulations, section 23.402).

6.5 High peak voltage test generator. Equipment to produce the high peak voltage necessary to calculate electrical resistance, as specified in 4.8.15.1 may be of any design producing required parameters. Information pertaining to approved equipment and test methods may be obtained from the US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, Michigan 48397-5000.

6.6 Subject term (key word) listing.

Distributor, integral coil 24 V, waterproof ignition system
Ignition system, distributor, integral coil 24 V, waterproof

6.7 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - AT

Preparing activity:
Army - AT

Review activities:
Army - ME
DLA - CS

(Project 2920-0426)

User activities:
Army - ER
Navy - MC