

INCH-POUND

MIL-PRF-13718D

31 December 1996

SUPERSEDING

MIL-R-13718C

30 September 1981

PERFORMANCE SPECIFICATION

RELAYS, ELECTROMAGNETIC
24 VOLT DC

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

1. SCOPE

1.1 Scope. This specification covers 24 volt direct current (Vdc) electromagnetic relays (see 6.1).

1.2 Classification. Relays are of the following types and grades as specified (see 6.2):

Type I	- Continuous duty.
Type II	- Intermittent duty.
Grade A	- Waterproof.
Grade B	- Nonwaterproof.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirement documents cited in sections 3 and 4 of this specification, whether or not they are listed.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000, by using the 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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2.2 Government documents.

2.2.1 Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

ARMY

7717664	- Relay, Current.
8724750	- Relay and Housing Assembly.
8762321	- Relay, Solenoid.
10894808	- Relay and Housing Assembly.

(Copies of these drawings are available from the U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

ANSI/ASQC Z1.4	- Sampling Procedures and Tables for Inspection by Attributes (DoD Adopted).
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(Application for copies should be addressed to American National Standard Institute, 11 West 42nd Street, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117	- Standard Practice for Operating Salt Spray (Fog) Apparatus.
ASTM G21	- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

(Application for copies of ASTM publications may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

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2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.2 Materials. Materials used shall be in accordance with the manufacturer's materials specifications for relays. The materials shall be capable of meeting all the operational and environmental requirements specified herein (see 4.6.1).

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Dissimilar metals. Except where necessary to complete an electrical circuit, contact between dissimilar metals, which would encourage galvanic action, shall be avoided (see 4.6.1).

3.2.3 Metals. Exterior metals shall be of a corrosion resistant type (see 4.6.1).

3.2.4 Insulation.

3.2.4.1 Molded. Cotton or cellulose-filled molded materials shall not be used (see 4.6.1).

3.2.4.2 Laminated. Cotton base laminates shall not be used (see 4.6.1).

3.3 Design and construction. Relays shall be constructed to the form and dimensions as specified on Drawings 7717664, 8724750, 8762321 or 10894808 (see 4.6.2), or as specified (see 6.2). Rating of part shall be as specified on drawing and shall be based upon an ambient temperature of $77^{\circ} \pm 15$ degrees Fahrenheit ($^{\circ}\text{F}$).

3.3.1 Interchangeability. To provide for interchangeability, relays fabricated in accordance with this specification shall have external dimensions that fall within envelope outline of applicable drawing. Electrical connectors, mounting dimensions and location shall also conform to detail requirements of applicable documents (see 4.6.2).

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3.3.2 Locking device. Lock washers, self-locking nuts, safety wires, or other approved locking devices shall be incorporated where specified, or where required to prevent loosening of components (see 4.6.2).

3.3.3 Electrical terminals. Terminals shall conform to applicable drawings, specifications, and standards. Terminals shall have normal current conducting path (see 4.6.2).

3.3.4 Electrical connectors. Connectors shall conform to applicable drawings, specifications, and standards (see 4.6.2).

3.3.5 Mounting. When brackets are used, they shall be an integral part of relay housing, or shall be securely attached thereto to prevent any movement between relay and mounting bracket in service, and to permit electrical contact to ground, if needed (see 4.6.2).

3.3.5.1 Ground. The finish around mounting holes shall permit electrical contact to ground when relay is mounted as in intended use. This requirement does not apply to relays mounted on insulated bases (see 4.6.2).

3.3.5.2 Position. Relay shall operate as specified herein when mounted in any position (see 4.6.2).

3.3.6 Polarity. Relays shall operate in negatively grounded circuits (see 4.6.2).

3.3.7 Mechanical failure. Construction shall be such that failure of linkage between actuator and movable contacts will result in contacts moving to deenergized position when relay is deenergized (see 4.6.2).

3.3.7.1 Springs. Springs shall not be used to transmit current (see 4.6.1 and 4.6.2).

3.3.8 Weight. Weight of relay shall conform to applicable drawings, specifications, and standards (see 4.6.2).

3.4 Performance.

3.4.1 Terminal torque resistance. External terminal shall withstand 25 inch-pounds (in-lb) torque without damage to terminals or adjacent parts (see 4.6.3).

3.4.2 Connector strength. Connector shall withstand a load of 20 pounds (lb), applied along connector centerline in a direction away from relay housing, without deformation which would prevent attachment of mating connector (see 4.6.4).

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3.4.3 Dielectric withstanding voltage. Relay shall withstand an applied voltage of 500 volts root mean square (rms) at a frequency of 60 Hertz (Hz) for 60 seconds between terminals, and between each contact terminal and each coil terminal. Insulation materials shall evidence no burning, charring, smoking, or rupture. Relay shall subsequently meet the requirements of 3.4.6 (see 4.6.5).

3.4.4 Pickup voltage. Relay pickup voltages shall not exceed maximum value specified on applicable drawings, specifications, and standards in any air temperature between 170°F and -70°F (see 4.6.6).

3.4.5 Dropout voltage. Relay dropout voltage shall conform to applicable drawings, specifications, and standards in any ambient air temperature between 170°F and -70°F (see 4.6.7).

3.4.6 Contact voltage drop. Voltage drop across relay contacts, measured at relay terminals, shall be not more than 150 millivolts (mV), except after overload (see 3.4.7), endurance (see 3.4.8), inductive load (see 3.4.11), or vibration (see 3.4.13) performance (see 4.6.8).

3.4.7 Overload. Relay shall withstand 50 000 cycles of making and breaking in circuit with a resistive load equal to 2.5 times normal resistive load rating (see 4.6.9 through 4.6.9.2). Thereafter, voltage drop across relay contacts, measured at relay terminals, shall be not more than 250 mV (see 3.4.6).

3.4.8 Endurance. Relay shall withstand 100 000 cycles of making and breaking in circuit with a resistance load equal to normal resistive load rating (see 4.6.10). Thereafter, voltage drop across relay contacts measured at relay terminals shall be not more than 250 mV (see 3.4.6).

3.4.9 Coil current. Coil current shall conform to values specified on applicable drawings, specifications, and standards when relay is subjected to maximum operating voltage applied to coil terminals (see 4.6.11).

3.4.10 Contact bounce and operating time. Contact bounce and operating time shall conform to applicable drawings, specifications, and standards (see 4.6.12).

3.4.11 Inductive load. In an inductive load circuit conforming to applicable drawing, relay shall withstand 10 000 cycles of operation (see 4.6.13). Thereafter, voltage drop across relay contacts measured at relay terminals shall be not more than 250 mV (see 3.4.6).

3.4.12 Transient voltage characteristics. Any voltage spike generated by relay shall be not more than ± 250 volts (see 4.6.14).

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3.4.13 Environmental conditions.

3.4.13.1 Vibration. Relays shall withstand in-field operational vibration for 100 hours without any breakage, loosened parts, or malfunction (see 4.6.15). Thereafter, relay shall withstand 100 cycles of making and breaking in circuit with a resistive load equal to normal resistive load rating (see 3.4.8). Thereafter, voltage drop across relay contacts measured at relay terminals shall be not more than 250 mV (see 3.4.6).

3.4.13.2 Waterproofness. Grade A relay shall be waterproof (see 4.6.16).

3.4.13.3 Shock. Relay shall withstand in field operational shock for 100 hours without any breakage, loosened, parts, or malfunction. Shock pulse shall be 40 gravity units with a duration of 11 ms (see 4.6.17). Thereafter, contact bounce and operating time shall conform to applicable drawings, specifications, and standards (see 3.4.10).

3.4.13.4 Corrosion resistance. Relay shall withstand 200 hours in a salt fog environment without corrosion that adversely affects performance (see 4.6.18). Thereafter, relay shall conform to the requirements in 3.4.4 and 3.4.5, and shall withstand 500 cycles in conformance with the requirements in 3.4.8.

3.4.13.5 Fungus resistance. Relay shall resist fungus growth that adversely affects performance (see 4.6.19). Thereafter, relay shall conform to the requirements in 3.4.4 and 3.4.5, and shall withstand 500 cycles in conformance with the requirements 3.4.8.

3.5 Finish. Cleaning, pretreatment, priming, and painting shall conform to the manufacturer's standards. Paint shall not be applied to any grounding surfaces (see 3.3.5.1 and 4.6.2).

3.6 Marking (see 4.6.2).

3.6.1 Identification marking. Identification marking shall be in accordance with the manufacturer's standard practices and shall include the following:

- a. Nomenclature
- b. Rating: 24 volts, amperes
- c. Part or Identifying Number (PIN) (see 6.2 and 6.4)
- d. Federal stock number
- e. Manufacturer's name or identification
- f. Contract number
- g. Date of manufacture (month, year, e.g., May 91).

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3.6.2 Nameplate. Nameplates shall conform to A-A-50271.

3.7 Workmanship. Workmanship shall be such as to assure a product free of burrs, rust, scratches, chips, sharp edges, loose or defective connectors, cracked insulation and faulty soldering (see 4.6.2).

4. VERIFICATION

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

- a. First article inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Inspection conditions. Inspection shall be conducted under general conditions acceptable to the Government. Unless otherwise specified (see 6.2), all tests shall be conducted on samples that have been temperature stabilized for 24 hours at $77^{\circ} \pm 15^{\circ}\text{F}$; however, soaking need not be repeated where tests are continuous at that temperature.

4.3 First article inspection. Six sample relays shall be subjected to first article inspection. First article inspection shall consist of examination specified in 4.5, and tests specified in table I.

TABLE I. Order of first article testing.

Title	Specimen No.	Requirement	Test
Pickup voltage	1 and 2	3.4.4	4.6.6
Dropout voltage		3.4.5	4.6.7
Contact voltage drop		3.4.6	4.6.8
Dielectric withstanding voltage		3.4.3	4.6.5
Coil current		3.4.9	4.6.11
Inductive load		3.4.11	4.6.13
Fungus resistance		3.4.17	4.6.19
Contact voltage drop		3.4.6	4.6.8
Pickup voltage ($77^{\circ} \pm 15^{\circ}\text{F}$ only)		3 and 4	3.4.4
Dropout voltage ($77^{\circ} \pm 15^{\circ}\text{F}$ only)	3.4.5		4.6.7
Contact voltage drop	3.4.6		4.6.8
Dielectric withstanding voltage	3.4.3		4.6.5
Overload	3.4.7		4.6.9
Contact voltage drop	3.4.6		4.6.8
Waterproofness (grade A)	3.4.14		4.6.16
Transient voltage characteristics	3.4.12		4.6.14

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TABLE I. Order of first article testing - Continued.

Title	Specimen No.	Requirement	Test
Vibration		3.4.13	4.6.15
Contact voltage drop		3.4.6	4.6.8
Shock		3.4.15	4.6.17
Contact bounce and operating time		3.4.10	4.6.12
Corrosion resistance		3.4.16	4.6.18
Contact voltage drop		3.4.6	4.6.8
Pickup voltage (77° ± 15°F only)		3.4.4	4.6.6
Dropout voltage (77° ± 15°F only)		3.4.5	4.6.7
Dielectric withstanding voltage		3.4.3	4.6.5
Contact voltage drop	5 and 6	3.4.6	4.6.8
Terminal torque resistance <u>1/</u>		3.4.1	4.6.3
Connector strength <u>1/</u>		3.4.2	4.6.4
Endurance		3.4.8	4.6.10
Contact voltage drop		3.4.6	4.6.8

1/ As applicable

4.3.1 Failure. Failure of any sample to conform to any requirement specified herein shall cause the Government to withhold approval of first article until action by the contractor, to correct defects and prevent recurrence, has been demonstrated and approved by the Government.

4.4 Conformance inspection. Conformance inspection shall include the examinations of 4.5 and the tests of 4.6 (see table II).

TABLE II. Order of conformance testing.

Title	Requirement	Test
Pickup voltage (77° ±15°F only)	3.4.4	4.6.6
Dropout voltage (77° ±15°F only)	3.4.5	4.6.7
Contact voltage drop	3.4.6	4.6.8
Coil current	3.4.9	4.6.11
Dielectric withstanding voltage	3.4.3	4.6.5
Inductive load	3.4.11	4.6.13

4.4.1 Sampling. Samples for conformance inspection shall be selected in accordance with ANSI/ASQC Z1.4.

4.5 Examination. Each relay shall be examined for compliance with the requirement specified in 3.2 and 3.3. Any redesign or modification of the contractor's standard to comply with specified requirements shall receive particular attention for adequacy and suitability and shall be approved by the Government contracting officer. This element of inspection shall encompass

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all visual examinations and dimensional measurements of requirements. Noncompliance with any specified requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.6 Method of inspection.

4.6.1 Materials. Conformance to 3.2, and 3.2.2 thru 3.2.4.2 shall be determined by inspection of contractor records providing proof of certification that the materials conform to the 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 Classification of defects. Conformance to 3.3, 3.3.1 thru 3.3.7, 3.3.7.1, 3.3.8, 3.5, 3.6, and 3.7 shall be determined by examination to the defects in table III. Examination shall be visual, tactile, or by measurement with SIE.

TABLE III. Classification of defects.

Category	Defect	Method of examination
<u>Major:</u>		
101	Dimensions affecting interchangeability, not within tolerance (see 3.3 and 3.3.1).	SIE <u>1/</u>
102	Inadequate locking devices (see 3.3.2).	Visual
103	Terminals and connectors not as specified (see 3.3.3 and 3.3.4).	Visual and SIE
104	Mounting not as specified (see 3.3.5).	Visual
105	Polarity reversed (see 3.3.6).	SIE
106	Mechanical failure (see 3.3.7).	Visual
107	Springs (see 3.3.7.1).	SIE
108	Weight not as specified (see 3.3.8).	
109	Paint on grounding surfaces (see 3.5).	Visual
<u>Minor:</u>		
201	Dimensions not affecting interchangeability, not within tolerance (see 3.3).	SIE
202	Improper finish (see 3.5).	Visual
203	Improper marking (see 3.6).	Visual
204	Faulty workmanship (see 3.7).	Visual

1/ SIE = Standard Inspection Equipment.

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4.6.3 Terminal torque resistance test (external). To determine conformance to 3.4.1, with relay mounted as in intended use, a force of 25 inch-pounds of torque shall be applied at base of terminal for one minute.

4.6.4 Connector strength test. To determine conformance to 3.4.2, with relay mounted as in intended use, a load of 20 pounds shall be applied gradually to connector in direction away from relay housing.

4.6.5 Dielectric withstanding voltage test. To determine conformance to 3.4.3, relay shall be subjected to the following procedures. Applied voltage shall be 500 volts rms, at a frequency of 60 cycles per second (Hz), for 60 seconds between each terminal, and between each contact terminal and each coil terminal. Voltage shall be applied, and reduced, at a maximum rate of change of 250 volts per second. Relay shall subsequently be subjected to test specified in 4.6.8.

4.6.6 Pickup voltage test. To determine conformance to 3.4.4, after relay has been temperature stabilized, relay shall be energized several times until stability of pickup voltage readings indicates that residual magnetism has built up to normal value. Relay shall then be tested for 10 cycles (deenergize and energize) to determine that energized function is completed when a potential not in excess of pickup voltage specified on the applicable drawing is applied. A suitable indicating device shall be used to determine that contacts operate satisfactorily. Upon completion, test shall be repeated in turn at ambient air temperatures specified in 4.2.1.1 and 4.2.1.2.

4.6.7 Dropout voltage test. To determine conformance to 3.4.5, after it has been temperature stabilized, relay shall be energized with 28 Vdc. Voltage shall then be reduced. Relay shall release to deenergized position within limits of dropout voltage as specified on applicable drawing. The above shall be repeated for 10 cycles. A suitable device shall be used to determine that contacts operate satisfactorily. Upon completion, test shall be repeated in turn at ambient air temperatures specified in 4.2.1.1 and 4.2.1.2.

4.6.8 Contact voltage drop test. To determine conformance to 3.4.6, after it has been temperature stabilized, relay shall be subjected to rated ampere load through contacts, and 28 Vdc on coil. Voltage drop across contact terminals shall be measured within 10 seconds after contact close. Contacts shall be caused to break, and then to make, verify load current before each voltage drop measurement. Average of 10 consecutive and individual readings shall be recorded.

4.6.9 Overload test. To determine conformance to 3.4.7, after it has been temperature stabilized, relay shall be energized with 28 Vdc. Minimum voltage at contacts under load shall be 24 volts. Relay shall be subjected to following overload test.

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4.6.9.1 Type I. Relay shall be operated for 50 000 cycles making and breaking a resistive load equal to 2.5 times normal resistive load rating. Duty cycle shall be 0.2 ± 0.05 second on, 20 ± 1 seconds off. At conclusion of test, relay shall be subjected to 1 cycle of operation, energized at foregoing load for a period of 30 seconds. Subsequently, relay shall be tested as specified in 4.6.8.

4.6.9.2 Type II. Relay shall be subjected to tests specified in 4.6.9.1, except that duty cycle shall be 1 second on, 60 seconds off.

4.6.10 Endurance test. To determine conformance to 3.4.8, relay shall be energized with 28 Vdc. Minimum voltage at contacts under load shall be 24 volts. Relay shall be subjected to following endurance test.

4.6.10.1 Type I. Relay shall be operated for 100 000 cycles making and breaking a resistive load equal to its normal resistive load rating. Duty cycle shall be 0.5 ± 0.05 second on, 2.5 ± 0.1 seconds off. One hundred thousand (100 000) cycles of operation shall be conducted at following ambient air temperatures:

<u>Number of cycles</u>	<u>Temperature</u>
25 000	$+160^{\circ} \pm 5^{\circ}\text{F}$
25 000	$-65^{\circ} \pm 5^{\circ}\text{F}$
50 000	$+77^{\circ} \pm 15^{\circ}\text{F}$

Prior to operation at each temperature, relay shall have been stabilized at that temperature for 24 hours. Subsequently, relay shall be tested as specified in 4.6.8.

4.6.10.2 Type II. Relay shall be subjected to test specified in 4.6.9.1, except that duty cycle shall be 0.5 ± 0.05 second on, 10 ± 0.10 seconds off.

4.6.11 Coil current test. To determine conformance to 3.4.9, after relay has been temperature stabilized, maximum operating voltage shall be applied to coil terminals and current flow determined within 10 seconds after application of coil voltage.

4.6.12 Contact bounce and operating time test. To determine conformance to 3.4.10, measurements of relay closing times and contact bounce at 28 Vdc shall be taken. Time duration of contact bounce shall be taken from the average of 5 consecutive and individual measurements.

4.6.13 Inductive load test. To determine conformance to 3.4.11, after it has been temperature stabilized, relay shall be operated for 10 000 cycles in an inductive load circuit. Load circuit shall have a time constant (time required for the current to reach 63.2 percent of its steady-

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state value, found by dividing inductance in henries by resistance in ohms) of 0.026 seconds. Cycling time shall be as specified in 4.6.9. Subsequently, relay shall be tested as specified in 4.6.8.

4.6.14 Transient voltage characteristics test. To determine conformance to 3.4.12, relay shall be energized at maximum operating voltage. When relay is deenergized, voltage spike generated shall be measured with an oscilloscope.

4.6.15 Vibration test. To determine conformance to 3.4.13.1, relay shall be mounted in a test fixture and subjected to vibration test for ground equipment, and shall be subjected to the vibration spectrum for 3 hours minimum in each of the three axes for 30 minutes logarithmic sweep 5 to 500 Hz (see figure 1). One of the principal axes of vibration shall be along the line of contact movement. During each run, relay shall be energized at its normal resistive load rating for half of the time. Cycling shall be as specified in 4.6.10. During test, observation shall be made for any vibration-induced bounce of relay contacts. At conclusion of test, relay shall be inspected for evidence of damage. Relay shall then be tested as specified in 4.6.10, except that length of test shall be 100 cycles.

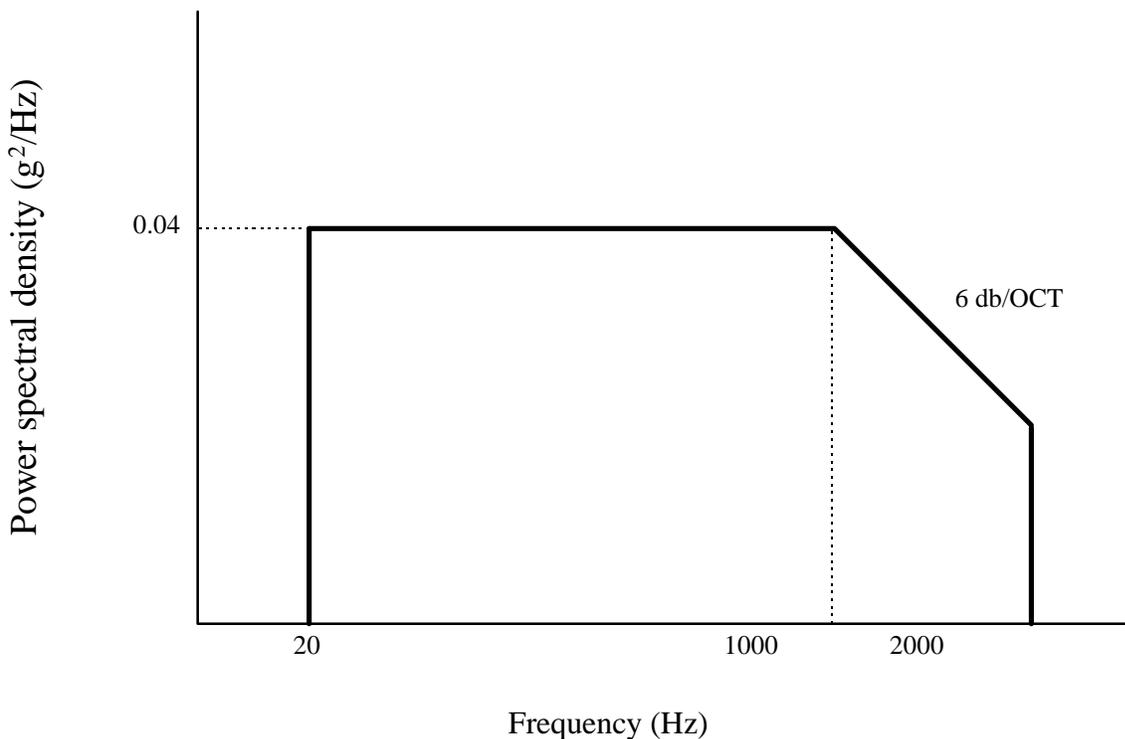


FIGURE 2. Minimum integrity test-general.

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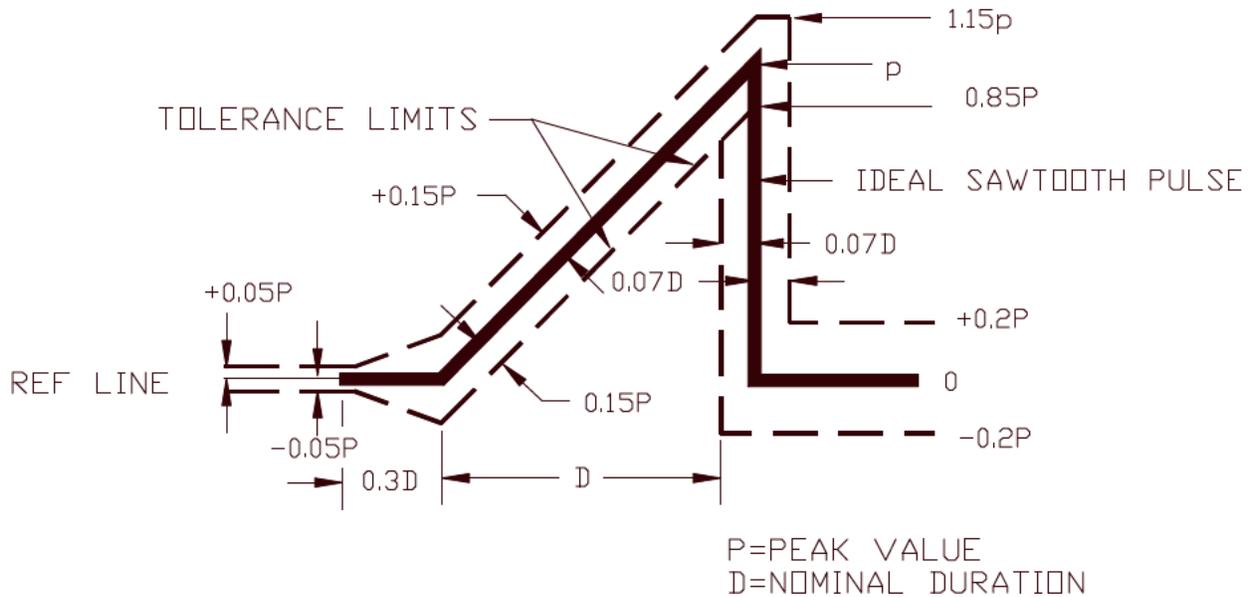
4.6.16 Waterproofness test. To determine conformance to 3.4.13.2, grade A relays shall be subjected to the following test methods:

- Step 1. The component, with its electrical connections, shall be submerged in a container with the uppermost surface a minimum of one inch below the surface of the saline solution and installed in the chamber. The component shall be carefully observed during its entire period of submersion and shall be operated while submerged for 30 minutes at full rated current and voltage. The chamber shall be evacuated to a pressure six pounds below atmospheric so as to apply a minimum of six pounds per square inch (psi) in internal pressure to all voids within the component. During this period the component shall be carefully observed for poor seals, as evidenced by bubbles escaping from the interior of the component. Leakage thus indicated shall be considered as noncompliance with the waterproofness requirement and the component shall be rejected. Bubbles which are the result of entrapped air on the exterior surfaces of the component shall not be considered leak.
- Step 2. The chamber shall then be pressurized to six pounds above atmospheric and the component again operated for 30 minutes.
- Step 3. Components shall be disassembled as normally required in servicing and inspection made for the presence of water. If water is present, the component shall be rejected. If the component is dry, it shall be reassembled and subjected to 15 hours of dry operation (three 5-hour periods) at full rated current and voltage. Insulation breakdown or other damage that would impair mechanical or electrical operation of the component shall be considered as evidence of failure.

4.6.17 Shock test. To determine conformance to 3.4.13.3, relay shall be subjected to saw tooth shock test for ground equipment in accordance with figure 2. One of the principal axes of shock pulses shall be along the line of contact movement. During each pulse, relay shall be energized with pickup voltage specified in applicable drawing, and shall remain energized throughout test. Duration of contact bounce shall be observed and recorded. Care shall be taken to insulate recording device from shock. After test, specimen shall be examined for loose or broken parts. Thereafter, specimen shall be tested as specified in 4.6.12.

4.6.18 Corrosion resistance test. To determine conformance to 3.4.13.4, relay shall be subjected to salt fog test specified in ASTM B117, except that duration of test shall be 200 hours. Immediately upon completion of test, relay shall be rinsed in lukewarm water, temperature stabilized, and tested as specified in 4.6.6, 4.6.7, and for 500 cycles as specified in 4.6.10.

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Test	Minimum peak value (P) g's		Nominal duration (D) ms	
	Flight vehicle equipment <u>1/</u>	Ground equipment	Flight vehicle equipment <u>1/</u>	Ground equipment
Operation test	20	40 <u>2/</u>	11	11
Crash safety	40	75	11	6

1/ Shock parameters a and c: recommended for equipment not shock-mounted and weighing less than 300 lb.

2/ Equipment mounted only in trucks and semitrailers may use a 20g peak value.

NOTE: The oscillogram shall include a time about 3D long with a pulse located approximately in the center. The peak acceleration magnitude of the sawtooth pulse is P and its duration is D. The measured acceleration pulse shall be contained between the broken line boundaries and the measured velocity change (which may be obtained by integration of the acceleration pulse) shall be within the limits of $V_i \pm 0.1 V_i$, where V_i is the velocity change associated with the ideal pulse which equals $0.5 DP$. The integration to determine velocity change shall extend from $0.4D$ before the pulse to $0.1D$ after the pulse.

FIGURE 2. Terminal-peak sawtooth shock pulse configuration and its tolerance limits (for use when shock response spectrum analysis capability is not available).

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4.6.19 Fungus resistance test. To determine conformance to 3.4.13.5, relay shall be subjected to fungus test in accordance with ASTM G21, except that test duration shall be 90 days. Upon completion of test, relay shall be temperature stabilized and tested as specified in 4.6.6, 4.6.7, and for 500 cycles as specified in 4.6.10.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Relays covered by this specification are intended for use as master relays, starter circuit relays, or control relays in tactical military vehicles.

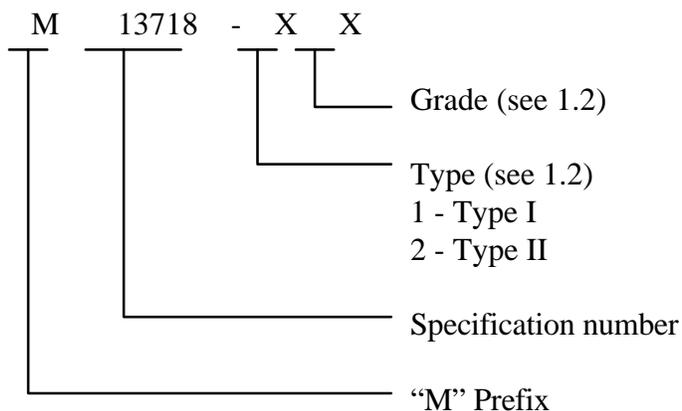
6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type and grade of relay (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.3).
- d. First article if required (see 3.1).
- e. Applicable drawing number or as specified (see 3.3).
- f. Part or identifying number (PIN) (see 3.6.1).
- g. If samples should not be temperature stabilized as specified (see 4.2).
- h. Packaging requirements (see 5.1).

6.3 Definitions. Definitions of terminology used within should be as specified in MIL-R-6106.

6.4 Part or identifying number (PIN). The PIN to be used for relays acquired by this specification is as follows:

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6.5 Subject term (key word) listing.

- Continuous duty
- Control
- Dropout voltage
- Electrical
- Intermittent duty
- Master
- Nonwaterproof
- Pickup voltage
- Starter circuit
- Tactical vehicles
- Waterproof

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:

- Army - AT
- Navy - MC
- Air Force - 99

Preparing Activity:

Army - AT

(Project 2920-0465)

Review Activities:

- Army - CR, MI, SC
- DLA - CS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-13718D	2. DOCUMENT DATE (YYMMDD) 961231
3. DOCUMENT TITLE RELAYS, ELECTROMAGNETIC 24 VOLT DC		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME	b. TELEPHONE (Include Area Code) (1) Commercial (810) 574-8745	(2) AUTOVON 786-8745
c. ADDRESS (Include Zip Code) Commander U.S. Army Tank-automotive and Armaments Command ATTN: AMSTA-TR-E/BLUE Warren, MI 48397-5000	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	