INCH-POUND
MIL-PRF-62364B
10 March 1997
SUPERSEDING
MIL-B-62364A(AT)
6 March 1984

PERFORMANCE SPECIFICATION

BRAKE, ELECTROMAGNETIC, NORMALLY ENGAGED

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

1. SCOPE

1.1 Scope. This specification covers two types of electromagnetic brake assemblies. Each, when electrically energized, releases a shaft to permit motion. When de-energized, the brake assemblies apply braking to the driving shaft to arrest its motion.

1.2 Classification. The electromagnetic brake assembly will be one of the types listed below:

Type I	Part number M62364-1	Brake, Slew
Type II	Part number M62364-2	Brake, Track

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified 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 2530

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-202	- Test Methods for Electronic and Electrical Component Parts.
MIL-STD-810	- Environmental Test Methods and Engineering Guidelines.
MIL-STD-1275	- Characteristics of 28 Volt DC Electrical Systems in Military Vehicles.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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

NUCLEAR REGULATORY COMMISSION (NRC)

Code of Federal Regulations (CFR) - Title 10, Parts 30 and 40.

(Copies of the Code of Federal Regulations (CFR) are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

DRAWINGS

DEPARTMENT OF DEFENSE

12265502	- Brake, Electromagnetic, Energize, to Release (Fail-Safe).
12265895	- Housing, Mechanical Drive, Gearbox.

(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 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 4.2.

3.2 Materials. The materials specified on Drawing 12265502 shall be used for guidance purposes only (i.e.: to determine form fit, and size so as to be compatible with referenced interface Drawing 12265895). The materials shall be capable of meeting all the performance and environmental requirements specified herein. Asbestos, cadmium, and radioactive material shall not be used in this item. Radioactive material is defined by CFR, Title 10, Parts 30 and 40, and other radioactive material in which the specific activity is greater than 0.002 microcuries per gram or the activity per item equals or exceeds 0.01 microcuries (see 4.5.1).

3.2.1 Corrosion resistance. All metals shall be corrosion resistant or shall be suitably protected against corrosion, internally and externally, during normal service life. Particular attention shall be paid to the metal and finish in contact with the friction brake material to assure under operating conditions that the friction material does not become contaminated by foreign particles of metal or protective finish residues which will alter performance of the brake. Dissimilar metals shall either be insulated to prevent galvanic corrosion or shall not be used (see 4.5.1).

3.2.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs (see 4.5.1).

3.2.3 Fungus. Only materials which are fungus non-nutrient shall be used (see 4.5.1).

3.3 Design and construction. The design and construction and cited specifications on Drawing 12265502, shall be used for guidance purposes only (i.e., to determine form, fit, and size so as to be compatible with referenced interface Drawing 12265895). The design shall meet all of the performance requirements and cited specifications and documents contained herein. The brake assembly shall be designed to mount on a gearbox, and to apply frictional braking to the output shaft by means of brake pads. The brakes will be utilized under the conditions of free

convection and conduction, and shall be capable of operating in any position. The brake assembly shall be designed in such a manner that the adjustment of torque requirements can be accomplished at the factory or depot repair level (see 4.5.1 and 4.5.2).

3.4 Performance.

3.4.1 Voltage. The brake assembly shall function and meet the requirements of this specification with an input voltage of 18 to 30 volts (V) direct current (dc) (see 4.5).

3.4.2 Voltage transient. The brake assembly, in operating and non-operating conditions, shall be capable of withstanding the transient voltages permitted by MIL-STD-1275 for fault-free, battery only, and single fault conditions (see 4.5.3.1).

3.4.3 Braking torque.

3.4.3.1 Static torque. The brake shall apply static friction to resist motion of the brake shaft when it is under torsional load. The friction level shall be set so that incipient creep shall occur when the shaft is torqued as follows (see 4.5.3.2.1):

Part number M62364-1: 55 inch pounds (in.-lb) [6.2 Newton meters (N-m)] ±10 percent
Part number M62364-2: 85 in.-lb (9.6 N-m) ±10 percent

3.4.3.2 Sliding torque. When the torque applied to a braked stationary shaft is increased to the specified static torque value, the brake shall begin to slip, and the shaft shall begin to rotate smoothly. Torque shall not exceed the specified static torque while the shaft is rotated through 15 to 30 revolutions (see 4.5.3.2.2).

3.4.3.3 Dynamic torque. When an initial coasting speed and inertial load are as specified in table I, the de-energized brake shall bring a rotating shaft to a complete stop within the time specified in table I (see 4.5.3.2.3).

TABLE I. Stopping time.

Part number	Inertia pound-inch-second^2 (Netwon-meter-second^2)	Initial speed revolutions per minute (rpm)	Stopping time seconds (s)
M62364-1	0.0145 (0.0016)	6242	0.40
M62364-2	0.0387 (0.0043)	1892	0.25

3.4.3.4 Drag torque. Drag torque is the torque required to rotate the brake shaft with the coil energized. The brake(s) shall have a drag torque of not more than 3 in.-lb (0.34 N-m) on the rotational brake shaft (see 4.5.3.2.4).

3.4.4 Air gap. When the coil is energized, the air gap between the brake pads and the brake disk shall be adjusted to not less than 0.005 inch (in.) [0.127 millimeter (mm)] (see 4.5.3.3).

3.4.5 Engagement time. The friction brake pads shall make contact with the brake disk within 0.1 s from the moment that the coil is de-energized (see 4.5.3.4).

3.4.6 Release time. The friction brake pads shall release from contact with the brake disk within 0.1 s from the moment that the coil is energized (see 4.5.3.4).

3.4.7 Insulation resistance. Insulation resistance shall be not less than 100 megohms from the coil terminals connected together and the case when 500 Vdc is applied (see 4.5.3.5).

3.4.8 Dielectric-withstanding voltage. The brake assembly shall withstand 500 V root-mean-square (rms), 60 hertz (Hz) for 1 minute, or 600 V rms for 1 s, between terminals connected together and the case. After initial test, the brakes shall be capable of withstanding repeated tests at 450 V rms 60 Hz. There shall be no degradation of performance (see 4.5.3.2.2 thru 4.5.3.5) following these tests (see 4.5.3.6).

3.4.9 Coil duty. Coil insulation shall be adequate for continuous operation at 24 Vdc when stabilized at 40 degrees Fahrenheit (°F) [60 degrees Celsius (°C)] and when installed on an aluminum gearbox, Drawing 12265895 (see 4.5.3.7).

3.4.10 Polarity. The brake assembly shall not be polarity sensitive (see 4.5.3.8).

3.4.11 Operating life. The electromagnetic brake assembly shall perform a minimum of 34 560 on-off cycles when applying and releasing the brake pads under static conditions, and in accordance with 3.4.3.3, a minimum of 4410 cycles of stopping and releasing the brake disk under dynamic conditions. The brake assembly shall be capable of performing the specified number of cycles under any environmental condition specified herein without failure, adjustment, or replacement of any component (see 4.5.3.9).

3.4.12 Environmental requirements. The design, materials, and construction of the brake assembly shall enable the unit to operate as specified in the environmental conditions called out in this specification during exposure to those environments designated as operating. The unit shall not be damaged nor its performance impaired after exposure to those environments designated as non-operating (see 4.5.3.10):

a. High temperature.
   1. Operating: 140°F (60°C)
   2. Non-operating: 158°F (70°C)

b. Low temperature.
   1. Operating: minus (-) 26°F (-32°C)
   2. Non-operating: -65°F (-54°C)

c. Humidity.
   1. Operating
      (a) Maximum: 100 percent (%) relative humidity (rh), at 85°F (29.4°C)
      (b) Minimum: 5% rh at 125°F (51.7°C)
   2. Non-operating
      (a) Maximum: 100 % rh at 80°F (26.7°C)
      (b) Minimum: 2% rh at 155°F (68.3°C)

d. Sand and dust.
   1. Operating and non-operating:
      (a) Particle size 3.937×10^{-6} to 3.937×10^{-2} in. (0.0001 to 1 mm)

e. Salt fog.
   1. Non-operating: 0.01 ounces/square feet/year
      (3 grams/square meter/year)

f. Vibration.
   1. Non-operating:
      (a) Type: Simple harmonic motion in 3 mutually perpendicular axes.
      (b) Condition:

Frequency	Amplitude
5 to 6.2 Hz	0.5 in. (12.7 mm) double amplitude (da)
6.2 to 25 Hz	±1 gravity unit (g)
25 to 200 Hz	±0.5 g

g. Shock.
   1. Non-operating: Wave form = half sine wave
      Peak value = 25 g minimum
      Duration = 11 milliseconds (ms)
      Applied along 3 mutually perpendicular axes.

h. Fungus growth. Environmental conditions conducive to fungus growth shall not impair brake performance or operation.

3.6 Identification marking. Unless otherwise specified (see 6.2), marking shall be permanent and legible and shall include, as a minimum, the manufacturer's identification code (CAGE), the contract number, and the national stock number (NSN) (see 4.5.2).

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

a. Air temperature: 77 ± 10°F.
b. Barometric pressure: 28.5 (+2, - 3) inches Hg of mercury.
c. Relative humidity: 50 ± 30 percent.

4.3 First article inspection. Unless otherwise specified (see 6.2), first article inspection shall be performed on preproduction or initial production samples as specified when a first article sample is required (see 3.1). This inspection shall include the examinations of 4.5.2 (see table II) and the tests of 4.5.3 through 4.5.3.10 (see table III).

TABLE II. Classification of defects.

Category	Defect	Method of examination
Major:		
101	Incomplete assembly (see 3.3)	Visual
102	Incorrect dimensions affecting interchangeability (see 3.3).	SIE 1/
103	Improper routing of safety wire (see 3.3).	Visual
Minor:		
201	Incorrect dimensions not affecting interchangeability (see 3.3).	SIE
202	Improper identification marking (see 3.6).	Visual

1/ SIE = Standard Inspection Equipment.

TABLE III. Classification of inspections.

Title	Requirement	Inspection	First article	Conform-ance tests
Materials and construction	3.2 thru 3.3	4.5.1	X	
Defects (see table II)	3.3, 3.6, and 3.7	4.5.2		X
Voltage transient	3.4.2	4.5.3.1	X	
Static torque	3.4.3.1	4.5.3.2.1	X	X
Sliding torque	3.4.3.2	4.5.3.2.2	X	X
Dynamic torque	3.4.3.3	4.5.3.2.3	X	X
Drag torque	3.4.3.4	4.5.3.2.4	X	X
Air gap	3.4.4	4.5.3.3	X	X
Engagement time	3.4.5	4.5.3.4	X	X
Release time	3.4.6	4.5.3.4	X	X
Insulation resistance	3.4.7	4.5.3.5	X	X
Dielectric-withstanding voltage	3.4.8	4.5.3.6	X	X
Coil duty	3.4.9	4.5.3.7	X	X
Polarity	3.4.10	4.5.3.8	X	X
Operating life	3.4.11	4.5.3.9	X	
Temperature, high	3.4.12.a	4.5.3.10.a	X	
Temperature, low	3.4.12.b	4.5.3.10.b	X	
Humidity	3.4.12.c	4.5.3.10.c	X	
Sand and dust	3.4.12.d	4.5.3.10.d	X	
Salt fog	3.4.12.e	4.5.3.10.e	X	
Vibration	3.4.12.f	4.5.3.10.f	X	
Shock	3.4.12.g	4.5.3.10.g	X	
Fungus	3.4.12.h	4.5.3.10.h	X	

4.3.1 Preproduction inspection. When specified (see 6.2), the preproduction sample shall consist of two electromagnetic brake assemblies. This inspection shall include the examinations of 4.4 (see table II) and the tests of 4.5.3 through 4.5.3.10 (see table III).

4.3.2 Initial production inspection. Unless otherwise specified (see 6.2), the Government shall select two electromagnetic brake assemblies from the first ten brake assemblies produced under the production contract for initial production inspection. This inspection shall include the examinations of 4.4 (see table II) and the tests of 4.5.3 through 4.5.3.10 (see table III).

4.4 Conformance inspection. Conformance inspection shall include the examinations of table II and the tests of 4.5.3.2.1 through 4.5.3.8 (see table III).

4.4.1 Sampling. Frequency of inspection and/or any special arrangements for establishing the frequency of inspection shall be as specified in the contract or purchase order (see 6.2).

4.4.2 Acceptance tests. Unless otherwise specified (see 6.2), each brake assembly shall be subjected to the examinations specified in table II and the conformance tests specified in table III.

4.5 Methods of inspection. Except where otherwise specified herein, all tests shall be conducted with input voltages as specified in 3.4.1.

4.5.1 Materials. Conformance to 3.2 through 3.3 shall be determined by inspection of contractor records providing proof or certification that 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.

4.5.2 Defects. Conformance to 3.3 and 3.6 shall be determined by examination for the defects listed in table II. Examination shall be visual, tactile, or by measurement with SIE.

4.5.3 Performance.

4.5.3.1 Voltage transient. The brake assembly shall be able to withstand transient voltages permitted by MIL-STD-1275 for fault-free, battery only, and single fault conditions in the operating and non-operating conditions (see 3.4.2).

4.5.3.2 Fixture tests. The tests described below shall be conducted in a test fixture that will simulate the actual operating environment of the brake system. The test setup shall include an appropriately configured motor shaft with integral specified inertial loads (see table I), a variable speed drive, electrical power, and control for the electromagnetic brake, and instrumentation to measure speed, torque, and time (see 3.4.3).

4.5.3.2.1 Static torque. To determine conformance to 3.4.3.1, use torque measuring equipment to determine static torque values. Peak torque values, measured at the initiation of shaft motion shall be used. The frictional torque resistance will decrease once shaft rotation has begun.

4.5.3.2.2 Sliding torque. To determine conformance to 3.4.3.2, engage the brake and apply increasing torque to the motor shaft. The shaft shall begin to rotate at the measured torque values in 4.5.3.2.1. The shaft shall continue to rotate slowly through 15 to 30 complete revolutions at applied torque not greater than the specified torque. Motion shall be smooth and continuous.

4.5.3.2.3 Dynamic torque. To determine conformance to 3.4.3.3, stopping performance under conditions of table I shall be measured. With the brake coil energized, the motor shaft with integral inertia load and the brake rotor shall be brought to the specified speed. The shaft with inertia load shall be released and then the brake coil shall be de-energized. Stopping time shall be measured from when power is removed from the brake coil until the brake rotor comes to a complete stop.

4.5.3.2.4 Drag torque. To determine conformance to 3.4.3.4, the brake assembly shall be tested for the amount of drag torque. This shall be determined by comparing rotational torque values of the brake shaft without the brake assembly installed versus the torque values with the brake assembly installed in the fixture.

4.5.3.3 Air gap. To determine conformance to 3.4.4, with the coil energized and using a feeler gage, the clearance between the brake pads and the brake disk shall be checked.

4.5.3.4 Engagement and release time. To determine conformance to 3.4.5 and 3.4.6, the amount of time required for the brake pads to engage and disengage from the moment the coil is energized and de-energized shall be measured.

4.5.3.5 Insulation resistance. To verify conformance to 3.4.7, the insulation resistance between coil terminals connected together and the case at 500 Vdc shall be tested as specified in MIL-STD-202, method 302, test condition B.

4.5.3.6 Dielectric - withstanding voltage. To conform to 3.4.8, tests shall be performed in accordance with MIL-STD-202, method 301. First, 500 V rms, 60 Hz, shall be applied for 1 minute, or 600 V rms, 60 Hz, shall be applied for 1 second, between terminals connected together and the case. Next, 450 V rms, 60 Hz, shall be applied for 1 minute and repeated at least 3 times (see 3.4.8).

4.5.3.7 Coil duty. To determine conformance to 3.4.9, energize to 24 Vdc, when stabilized, for not less than 18 hours. There shall be no deterioration of the brake coil following this test.

4.5.3.8 Polarity. To conform to 3.4.10, the brake assembly shall be tested for polar sensitivity.

4.5.3.9 Operating life. To determine conformance to 3.4.11, the brake assembly shall be subjected to dynamic conditions at the rate of 6 per hour or greater (see 3.4.3.3). There shall be no indication of brake assembly deterioration. At conclusion of the dynamic test, time to stop shall conform to table I, and static torque shall conform to 3.4.3.1. During the test, the ambient temperature shall be cycled between 140°F and -26°F (60°C and -32°C). The temperature cycle

shall be such that the first 1470 cycles shall be at 140°F followed by 1470 cycles at -26°F, and the last 1470 cycles at 140°F. The cycle rate of torque may be applied at any rate to satisfy the total number of required cycles. During the operating life test, there shall be no adjustments or replacement of any component. Dynamic tests shall be conducted on the test fixture specified in 4.5.3.2.

4.5.3.10 Environmental test conditions. To determine conformance to 3.4.12, the resistance of the brake assembly to the effects of natural and induced environments specified in paragraphs 4.5.3.2.1 through 4.5.3.6 shall be conducted under the operating conditions and after the non-operating conditions specified below:

a. To determine conformance to 3.4.12.a, tests shall be conducted at the high temperatures specified herein and applied in accordance with MIL-STD-810, method 501.3, procedure II.
b. To determine conformance to 3.4.12.b, tests shall be conducted at the low temperatures specified herein and applied in accordance with MIL-STD-810, method 501.3, procedure II.
c. To determine conformance to 3.4.12.c, tests shall be conducted to determine the resistance of the brake assemblies to the effects of exposure to warm highly humid atmospheres. The tests shall be conducted in accordance with MIL-STD-810, method 507.3, procedure I.
d. To determine conformance to 3.4.12.d, tests shall be conducted to ascertain the ability of the brake assemblies to resist the effects of a dry dust laden atmosphere. The tests shall be conducted in accordance with MIL-STD-810, method 510.3, procedure I, except the temperature shall be limited to 140°F (60°C) during step 5.
e. To determine conformance to 3.4.12.e, tests shall be conducted to determine the ability of the brake assemblies to resist the effects of a salt atmosphere. The tests shall be conducted in accordance with MIL-STD-810, method 509.3, procedure I.
f. To determine conformance to 3.4.12.f, tests shall be conducted to determine if the brake assemblies will withstand expected dynamic vibrational stresses and to ensure that performance degradations or malfunctions will not be produced by the service vibration environment. The tests shall be conducted in accordance with MIL-STD-202, method 204c, condition C.
g. To determine conformance to 3.4.12.g, tests shall be conducted to determine the ability of the brake assemblies to withstand expected dynamic shock stresses and that performance degradations or malfunctions will not be produced by the service shock environment expected in handling, transportation, and service use. The brake assemblies shall be tested in accordance with MIL-STD-202, method 213b, condition J.

h. To determine conformance to 3.4.12.h, fungus tests shall be conducted in accordance with MIL-STD-810, method 508.3. Certification by the manufacturer that only non-nutrients have been utilized may be submitted in lieu of testing.

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. The electromagnetic brake assembly described in this specification is intended for use in a weapon control system to provide braking and holding action.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.
b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1).
c. If first article is required (see 3.1).
d. Identification markings, if other than as specified (see 3.6).
e. Test conditions if other than specified (see 4.2).
f. If preproduction inspection is required (see 4.3.1).
g. If initial production inspection is required (see 4.3.2).
h. If sampling is required (see 4.4.1).
i. If acceptance test is required (see 4.4.2).
j. Packaging requirements (see 5.1).

6.3 Supersession information. Part number M62364-1 supersedes part number 12265502-1. Part number M62364-2 supersedes part number 12265502-2. Parts described by MIL-PRF-62364B(AT) are considered (two-way or one-way) interchangeable with previous document.

6.4 Part or Identification Number (PIN). The following describes the PIN number construction for use with parts acquired under this specification.

M 62364 - X

- X: Type (1 or 2) (see 1.2).
- 62364: General specification number.
- M: Prefix "M" indicates performance specification.

6.5 Subject term (key word) listing.

Coil
Dielectric
Disc
Friction
Gearbox
Holding action
Pad
Slew

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.

Custodian:
Army - AT

Review Activity:
DLA - CS

Preparing Activity:
Army - AT

(Project 2530-0388)

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-62364B	2. DOCUMENT DATE (YYMMDD) 970310

3. DOCUMENT TITLE BRAKE, ELECTROMAGNETIC, NORMALLY ENGAGED

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 U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND	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 22401-3466 Telephone (703) 756-2340 AUTOVON 289-2340