INCH-POUND
MIL-PRF-71229D (AT)
6 January 2011
SUPERSEDING
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PERFORMANCE SPECIFICATION

MOUNT, GUN, 120MM

This specification is approved for use by the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), Research, Development and Engineering Command (RDECOM), Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This gun mount is used with the 120MM Gun Cannon, M256, and in the Abrams Series Tanks.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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 requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

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 cited in the solicitation or contract (see 6.2).

Comments, suggestions, or questions on this document should be addressed to U.S. Army RDECOM, Tank Automotive Research, Development and Engineering Center, ATTN: RDTA-EN/STND/TRANS MS #268, 6501 E. 11 Mile Road, Warren, MI 48397-5000 or emailed to DAMI_STANDARDIZATION@conus.army.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.daps.dla.mil.

AMSC N/A FSC 1015

COMMERCIAL ITEM DESCRIPTIONS

A-A-52624 - Antifreeze, Multi Engine Type

DEPARTMENT OF DEFENSE SPECIFICATIONS

DoD-C-70429 - Cannon, 120MM Gun: M256

(Copies of these documents are available online at https://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 these documents are those cited in the solicitation or contract (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/(NFPA) T2.13.7 - Hydraulic Fluid Power - Petroleum Fluids - Prediction of Bulk Moduli

(Copies of these documents are available from www.ansi.org or ANSI Customer Service Department, 25 W. 43rd Street, 4th Floor, New York, NY 10036.)

ASTM INTERNATIONAL

ASTM D1655 - Standard Specification for Aviation Turbine Fuels (DoD Adopted)
ASTM D4175 - Standard Terminology Relating to Petroleum, Petroleum Products, and Lubricants (DoD Adopted)
ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi (DoD Adopted)

(Copies of these documents are available from www.astm.org or ASTM International, P.O. Box C700, West Conshohocken, PA 19428-2959.)

SAE INTERNATIONAL

SAE AMS 3054 - Oil, Lubricating, Low Temperature for -55 °C (-67 °F) Service (DoD Adopted)
SAE J300 - Engine Oil Viscosity Classification (DoD Adopted)
SAE J312 - Automotive Gasolines
SAE J313 - Diesel Fuels
SAE J1447 - Fire-Resistant Fluid Usage in Hydraulic Systems of Off-Road Work Machines

(Copies of these documents are available from www.sae.org or SAE Customer Service, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 Design, materials, and manufacturing processes. The design, materials, and manufacturing processes shall be in accordance with the manufacturer's standard practice as long as all articles submitted to the Government fully meet the operating, interface, support and ownership, and operating environment requirements specified herein.

3.3 Operating requirements. The gun mount, completely assembled and lubricated, shall operate without chatter, erraticness, or binding in all ranges of elevation, depression, and temperatures, without special aids under all operating conditions and as specified herein.

3.3.1 Hydraulic system. The gun mount shall be filled with hydraulic fluid, bled, and refilled until all air and moisture are eliminated. The initial and subsequent filling of the hydraulic system shall be with hydraulic oil and filtered through a 5-micron filter. Prior to and after mechanical gymnastication (see 3.3.1.1), a 100 ml ±5 ml sample volume of oil shall be drawn from the hydraulic system. The sample volume of oil shall be free of all metallic or abrasive particles that may cause damage to the inner surface of the operating mechanisms. These particles shall not exceed 600 microns in diameter (0.024 in.) except for nonmetallic lint and fibers, where a maximum of 35 particles between 600 and 3000 microns in greatest dimensions are allowed per one sample (see 4.5.1).

3.3.1.1 Mechanical gymnastication. Each gun mount shall be capable of mechanical gymnastication at elevations ranging from 0 to 35 degrees with a tolerance of ±2 degrees without evidence of erratic movement (see 4.5.1.1).

3.3.1.2 Hydraulic leakage - mechanical gymnastication. During and immediately following mechanical gymnastication, no more than 15 drops of oil shall accumulate at any location in a three minute period (see 4.5.1.2).

3.3.2 Counter-recoil (CTRR) time. The maximum CTRR time shall be 0.4 seconds at 0 ±2 degrees elevation, and 2.0 seconds at 35 ±2 degrees elevation (see 4.5.1.1).

3.3.3 Proof firing. Each gun mount shall be proof fired (see 6.6.1) or a sample shall be proof fired in accordance with the sampling plan (see 6.2) when simulation testing (see 6.6.2) is in effect (see 4.5.3).

3.3.4 Simulation testing. Simulation testing followed by proof firing according to a sampling plan may be used in lieu of 100 percent (%) proof firing providing the simulator is qualified as specified in 6.3. Simulation testing, providing this election is desired and approved, shall be conducted on each gun mount according to the simulation test provisions specified in 4.5.4 without evidence of malfunction or failure.

3.3.5 Recoil cycle. When firing (see 6.6.3) at 100% and 113 ±4% acceptance levels (see 6.6.4), the recoil cycle travel (in inches) and total recoil cycle time (in seconds) at 70 ±35 degrees Fahrenheit (°F) shall be as specified in table I (see 4.5.3.1).

TABLE I. Recoil cycle travel and time.

Elevation in degrees (±2)	Recoil cycle travel in inches (min - max)	Total recoil cycle time in seconds (max)
0 to 35	11.25 - 12.25	----
0	----	0.60
35	----	2.50

3.3.6 CTRR velocity. At 0.50 inch from the complete in-battery position, the CTRR velocity at 70 ±35 °F shall not exceed the values listed in table II (see 4.5.3.1):

TABLE II. CTRR velocity limits.

Elevation in degrees (±2°)	Max (ft/sec)
0	3.80
35	3.80

3.3.7 Recoil performance zones. Whether 100% proof firing or 100% simulation testing with a sample proof fired, the recoil cylinder oil pressure versus time and piston travel versus time curves for each gun mount tested shall be within the applicable recoil performance zones as specified on figures 1 through 4 at 70 ±35 °F (see 4.5.3.1).

3.3.8 Hydraulic leakage. During and immediately following each sequence of firing cycles for each gun mount, there shall be no more than 15 drops of oil accumulation at any location in a three minute period. After the gun mount sets statically for four hours and all joints are wiped clean, there shall be no more than three drops of oil accumulation at any location within a five minute period (see 4.5.3.2 and 4.5.4.1).

3.3.9 Camouflage. All externally visible parts shall be field camouflaged through dark color, such as black, olive drab, brown etc. selection and reflectance (see 4.5.5).

3.3.10 Weapon functioning. Either recoil or counter-recoil modes shall not show any indications of erratic operation. Any indication shall be cause for rejection (see 4.5.3.1).

3.4 Interface requirements. The gun mount shall accommodate the following inputs and interfaces.

3.4.1 M256 interface. The gun mount shall interface with the 120MM Gun Cannon, M256, as specified in DoD-C-70429 (see 4.6.1). The interface shall be as specified in the contract or order (see 6.2).

3.4.2 Case ejection. During counter-recoil action, the breech operating cam shall operate in conjunction with the breech mechanism to produce ejection of empty cases clear of the cannon and latch breech block in open position at all operational temperatures, except at extreme cold temperatures (-31 °F to -50 °F). When simulation testing, the velocity of counter-recoil at 3.0 ±0.25 inches from the complete in-battery position shall be as listed in table III (in order to satisfy the case ejection requirement) (see 4.6.2 and 4.6.3):

TABLE III. Counter-recoil velocity limits.

Elevation in degrees (±2°)	Min - max (ft/sec)
0	4.00 - 6.25
35	2.60 - 5.90

3.5 Support and ownership requirements. Each gun mount shall possess the following support and ownership characteristics.

3.5.1 Gun mount static pressure. Each gun mount shall withstand a sustained hydraulic static pressure of 3500 ±200 pounds per square inch (psi) for not less than 5 minutes without any leakage. NOTE: Extreme caution must be exercised during pressurization of gun mounts (see 4.7.1).

3.5.2 Identification. Unless otherwise specified (see 6.2), each gun mount shall have a primary permanent serial number identifier placed as an integral part of the cradle near the breech (see 4.7.2).

3.6 Operating environmental requirements. Each gun mount shall operate under the following environmental conditions without damage or loss of performance.

3.6.1 Climatic conditions. Gun mounts shall be fully operational between the temperature range of -50 °F and +125 °F without evidence of malfunction or failure (see 4.3.1.1).

3.6.1.1 Recoil cycle time. The recoil cycle time under climatic conditions at 100% and 113 +4% impulse levels between 0 degrees and 35 degrees elevation shall be as listed in table IV (see 4.3.1.1):

TABLE IV. Recoil cycle time.

Temperature (±5 °F)	Elevation in degrees (±2°)	Max cycle time (sec)
-50	0 & 35	N/A
+70	0	0.6
+70	35	2.5
+125	0 & 35	0.6

3.6.2 Vibration. The gun mount shall operate as intended after exposure to field service and transportation vibrations (see 4.8.1).

3.6.3 Chemicals, petroleum, oil, and lubricants. The gun mount shall operate as intended after exposure to chemical, petroleum, oil, and lubricant based products (see 4.8.2).

3.6.4 Sand and dust. The gun mount shall operate as intended while exposed to a sand and dust mixture of 42% "No. 1 Dry" sand, 8% "No. 3 Q-Rok" sand, and 50% 140-mesh silica flour. The gun mount shall then be subjected to a dynamic environment with the sand and dust dispersed at a rate of 100 ±25 grams per minute per square meter blown across the test area. In this environment, 3 rounds shall be proof fired without malfunction (see 4.8.3).

3.6.5 Altitude. The gun mount shall operate as intended at altitudes up to 10 000 feet above sea level (see 4.8.4).

3.6.6 Fungus. The gun mount shall operate as intended after exposure to tropical climate fungus, rot, or mildew (see 4.8.5).

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 Verification methods. The types of verification methods included in this section are visual inspection, measurement, sample tests, full-scale demonstration tests, simulation, engineering evaluation, and similarity to previously-approved or previously-qualified designs.

4.2.1 Verification alternatives. When specified in the contract (see 6.2), the manufacturer may propose alternative test methods, techniques, or equipment, including the application of statistical process control, tool control, or cost effective sampling procedures to verify performance.

4.3 First article inspection. Unless otherwise specified in the contract (see 6.2), a first article sample of two gun mounts shall be randomly selected from a minimum of four of the first

production gun mounts. The first article sample shall be inspected by the contractor and submitted to the Government for approval. Inspection shall be in accordance with all applicable verifications to determine conformance with the requirements of this specification. The first article sample shall be representative of the production processes of the manufacturing facility to be used during quantity production.

a. If 100% proof firing will be used for proof acceptance, then all proof firing tests shall be performed.
b. If 100% simulation (with proof firing according to the sampling plan) will be used for proof acceptance, then all simulation tests shall be performed. If the simulator is qualified, no first article proof firing tests are required. If the simulator is not qualified, then all simulation tests and all proof firing tests shall be performed.

4.3.1 First article proof firing. The first article sample shall be proof fired in accordance with 4.5.3 using table V in lieu of table VIII. All measurements required by 4.3 shall be read for each gun mount and each gun mount shall meet the requirements of 3.3 (see 6.2).

TABLE V. Proof firing - first article sample.

Round number	Elevation in degrees (±2°) (see 6.6.4 b.)	Acceptance level (see 6.6.4)
1	0	80-CPS see (appox. 80% UPL)
2	0	100-CPS (100% UPL)
3	10	113-CPS (113% UPL)
4	10	100-SS (113% UPL)
5	20	100-SS (113% UPL)
6	35	100-SS (113% UPL)
7	35	100-SS (113% UPL)
8	35	100-SS (113% UPL)
9	0	100-SS (113% UPL)

NOTE: Upper Pressure Limit (UPL)

4.3.1.1 Climatic conditions. Unless otherwise specified (see 6.2), the first article sample shall be proof fired to determine conformance to 3.6.1. Proof firing shall be in accordance with table V at each of the temperatures +125 ±5 °F, +70 ±5 °F and -50 ±5 °F. The recoil cycle time shall be measured to determine conformance with 3.6.1.1. Failure to conform to 3.6.1.1 shall be cause for rejection.

4.3.2 First article simulation testing. The first article sample shall be simulation tested in accordance with 4.5.4 using table VI in lieu of table IX. All measurements required by 4.4 shall be read for each gun mount, and each gun mount shall meet the requirements of section 3. When applicable, all simulation tests shall be performed prior to proof firing tests.

TABLE VI. Simulation testing - first article sample.

Round number	Elevation in degrees (±2°)	Minimum acceptance level (see 6.6.4)
1	0	50-CPS (approx. 50% UPL)
2	0	100-SS (113% UPL)
3	0	100-SS (113% UPL)
4	35	100-SS (113% UPL)
5	35	100-SS (113% UPL)
6	35	100-SS (113% UPL)
7	35	100-SS (113% UPL)
8	35	100-SS (113% UPL)
9	35	100-SS (113% UPL)
10	0	100-SS (113% UPL)
11	0	100-SS (113% UPL)
12	0	100-SS (113% UPL)
13	0	100-SS (113% UPL)

4.3.3 First article rejection. If any sample fails to conform to any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate its inspection upon any failure of the sample to conform to the requirements of this specification.

4.4 Conformance inspection. Unless otherwise specified (see 6.2), conformance inspection shall include the examinations and tests as specified in table VII. The column labeled "Simulation" in table VII represents the minimum inspection frequency if 100% simulation testing (with proof firing according to the sampling plan) is used instead of 100% proof firing for proof acceptance.

4.4.1 Lot formation. For conformance inspection, a lot shall be a group of like items produced using the same batches of materials, component lots, process runs, fabrication techniques, assembly techniques, tools, equipment, and facilities not greater than 100 gun mounts or a single shifts production, whichever is larger.

4.5 Operating requirement verification.

4.5.1 Hydraulic system. To determine compliance with 3.3.1, hydraulic oil shall be drained from an unobstructed access point in the lowest position of the hydraulic cylinder of each mount. The sample shall be taken a minimum of four (4) minutes after mechanical gymnastication. Any contaminant in the hydraulic system must be analyzed to determine whether there is a breakdown in the wiper/seals or if the metallic members are being excessively worn. Failure to comply with the requirements of 3.3.1 shall be cause for rejection.

TABLE VII. Verification methods.

Title	Requirement	Verification	Minimum inspection frequency 1/	
			100% proof fire	Simulation
Operating requirements	3.3	4.5.3 & 4.5.4	100% N/A	Sample 100%
Hydraulic system	3.3.1	4.5.1	100%	100%
Mechanical gymnastication	3.3.1.1	4.5.1.1	100%	100%
Hydraulic leakage - mechanical gymnastication	3.3.1.2	4.5.1.2	100%	100%
Counter-recoil (CTRR) time	3.3.2	4.5.1.1	100%	100%
Proof firing	3.3.3	4.5.3	100%	Sample
Simulation testing	3.3.4	4.5.4	Sample	100%
Recoil cycle	3.3.5	4.5.3.1	100% 2/	Sample 3/
CTRR velocity	3.3.6	4.5.3.1	100% 2/	Sample 3/
Recoil performance zones	3.3.7	4.5.3.1	2/yr 2/	2/yr 3/
Hydraulic leakage	3.3.8	4.5.3.2 & 4.5.4.1	100% 2/	Sample 3/
Camouflage	3.3.9	4.5.5	100%	100%
Weapon functioning	3.3.10	4.5.3.1	100% 2/	Sample 3/
Interface requirements	3.4	4.6	N/A	N/A
M256 interface	3.4.1	4.6.1	100% 2/	Sample 3/
Case ejection	3.4.2	4.6.2 & 4.6.3	100% 2/	Sample 3/
Support and ownership Requirements	3.5	4.7	N/A	N/A
Gun mount static pressure	3.5.1	4.7.1	100%	100%
Identification	3.5.2	4.7.2	100%	100%
Operating environmental Requirements	3.6	4.8	N/A	N/A
Climatic conditions	3.6.1	4.3.1.1	N/A	N/A
Recoil cycle time	3.6.1.1	4.3.1.1	N/A	N/A
Vibration	3.6.2	4.8.1	100%	100%
Chemicals, petroleum, oil, and lubricants	3.6.3	4.8.2	100%	100%
Sand and dust	3.6.4	4.8.3	100%	100%
Altitude	3.6.5	4.8.4	100%	100%
Fungus	3.6.6	4.8.5	100%	100%

NOTES:

1/ Proof acceptance may be accomplished by 100% proof firing or 100% simulation testing with a sample being proof fired. Only the applicable column applies.

2/ Minimum inspection frequency (MIF) during simulation testing is “N/A”.

3/ MIF during simulation testing is “100%”.

4.5.1.1 Mechanical gymnastication. Each gun mount, including the cannon or simulated equal, shall be mechanically gymnasticated to a recoil displacement of 11.75 ±0.5 inches at all required elevations with the gymnasticator set for a 6 ±2 second pull back and release time. Each gun mount shall be subjected to a minimum of 40 cycles as follows:

a. 20 cycles at 0 ±2 degrees
b. 20 cycles at 35 ±2 degrees

Smooth counter-recoil performance shall be required prior to completion of mechanical gymnastication. Failure to conform to the requirements of 3.3.1.1 and 3.3.2 shall be cause for rejection.

4.5.1.2 Hydraulic leakage - mechanical gymnastication. During and immediately following mechanical gymnastication, the hydraulic leakage shall be checked (number of drops at any location in a three minute period). Failure to conform to the requirements of 3.3.1.2 shall be cause for rejection.

4.5.3 Proof firing. Each gun mount shall be proof fired (see 6.6.1) as specified in 4.5.3.1 or a sample shall be proof fired in accordance with the sampling plan (see 6.2) when simulation testing (see 6.6.2) is in effect. Simulation testing followed by proof firing according to a sampling plan may be used in lieu of 100% proof firing for proof acceptance testing providing the simulator is qualified as specified in 6.3. Simulation testing for proof acceptance, providing this election is desired and approved, shall be conducted on each gun mount according to the simulation test provisions as specified in 4.5.4 without evidence of malfunction or failure (see 3.3.3).

4.5.3.1 Proof firing test provisions. Proof firing shall be as specified in table VIII and shall be performed at a Government proving ground. For proof firing, the test configuration shall be as specified in the contract (see 6.2). During proof firing, conformance to the requirements of 3.3.5 through 3.3.7 shall be verified. Measurement shall be read a minimum of twice a year to demonstrate conformance to the requirements of 3.3.6. During and after proof firing, each gun mount shall meet the requirements of 3.3.10. Observation shall be made for erratic motion during the entire firing cycle. Failure to conform to the requirements of 3.3.5 through 3.3.7 shall be cause for rejection.

4.5.3.2 Hydraulic leakage. Hydraulic leakage rate (number of drops at any location in a three minute period) shall be checked during and immediately following the test sequence as specified in table VIII. After firing, each gun mount shall be held for observation for four hours and then shall be examined to determine conformance to the oil leakage requirements as specified in 3.3.8. Failure to conform to the requirements of 3.3.8 shall be cause for rejection.

TABLE VIII. Proof firing - conformance.

Round number	Elevation in degrees (±2°) (see 6.6.4 b.)	Acceptance level (see 6.6.4)
1	0	80-CPS (approx. 80% UPL)
2	0	100-CPS (100% UPL)
3	20	113-CPS (113% UPL)
4	35	100-SS (113% UPL)

specified in the contract (see 6.2). During simulation testing, conformance to the requirements of 3.3.5 through 3.3.7 shall be verified. During and after simulation testing, the gun mount shall meet the requirements of 3.3.10. It is acceptable to perform testing on a test stand at zero elevation with adjustment made as applicable to simulate specified elevations. The simulator shall be varied as required to meet the stated impulse levels. Failure to conform to the requirements of 3.3.5 through 3.3.7 shall be cause for rejection.

TABLE IX. Simulation testing.

Round number	Elevation in degrees (±2°)	Minimum acceptance level (see 6.6.4)
1	0	Warm-up
2	0	100-SS (113% UPL)
3	0	100-SS (113% UPL)
4	35	100-SS (113% UPL)
5	35	100-SS (113% UPL)
6	35	100-SS (113% UPL)
7	35	100-SS (113% UPL)
8	35	100-SS (113% UPL)
9	0	100-SS (113% UPL)
10	0	100-SS (113% UPL)

NOTES:
1. The Upper Pressure Limit (UPL) for the M256 cannon (120MM) used with the M1A1 gun mount will be: 100% UPL = 88 100 psi and 113% UPL = 97 000 to 102 000 psi.
2. During extremely cold ambient conditions, additional warm-up rounds may be required before record rounds are attempted. Record rounds must be in the proper order.
3. During the conduct of the required record rounds, additional cycles may be included within each operational sequence to achieve conformance with 100% impulse levels and to avoid detectable double bumping or in the event of instrumentation malfunction.

4.5.4.1 Hydraulic leakage. Hydraulic leakage rate (number of drops at any location in a three minute period) shall be checked during (if there is a break of more than three minutes between firing cycles) and immediately following the test sequence as specified in table IX. After simulation testing, each gun mount shall be held for observation for four hours and then shall be examined to determine conformance to the oil leakage requirements as specified in 3.3.8. Failure to conform to the requirements of 3.3.8 shall be cause for rejection.

4.5.5 Camouflage inspection. Externally visible colors of all materials shall be inspected to be a dark color, such as black, olive drab, brown, etc., to facilitate existing military camouflage schemes. Ten measurements shall be taken at different points on the cradle surface using a 60 degree glossmeter. The average value of these readings shall not exceed 10% (see 3.3.9).

4.6 Interface requirement verification.

4.6.1 M256 interface. Using one or more of the methods outlined in 4.2 and 4.2.1, the gun mount shall be inspected for acceptable interface with the 120MM Gun Cannon, M256 as specified in the requirement of 3.4.1.

4.6.2 Case ejection - proof fire. During each proof firing cycle, empty cases shall eject properly for each gun mount proof fired. Failure to conform to the requirements of 3.4.2 shall be cause for rejection.

4.6.3 Case ejection - simulation. The velocity of counter-recoil at 3.0 ±0.25 inches from the complete in-battery position shall be measured for each gun mount simulation tested. Failure to conform to the requirements of 3.4.2 shall be cause for rejection.

4.7 Support and ownership requirement verification.

4.7.1 Gun mount static pressure. Each gun mount shall be pressurized in accordance with 3.5.1 and inspected for damage, permanent deformation, or leakage. Failure to conform to 3.5.1 shall be cause for rejection of the gun mount.

4.7.2 Identification inspection. The presence and correct assignment of the primary serial number shall be verified visually (see 3.5.2).

4.8 Operating environmental requirement verification.

4.8.1 Vibration evaluation. One gun mount shall be placed on the cargo bed of a tank simulator and the simulator shall be operated at 70 ±35 °F for the equivalent of 175 miles over rough road surfaces. After completion of this test, all components shall be inspected for any loss of functionality or physical damage (see 3.6.2). A proof firing test shall then be conducted on the gun mount.

4.8.2 Chemicals, petroleum, oil, and lubricants evaluation. The gun mount non-metallic component material compatibility shall be verified with the list of chemicals, petroleum, oil, and lubricants listed in table X by laboratory chemical analysis or evaluation (see 3.6.3).

4.8.3 Sand and dust demonstration. A sand and dust mixture similar to the following formula shall be prepared: 42% “No. 1 Dry” sand, 8% “No. 3 Q-Rok” sand, and 50% 140-mesh silica flour (see 3.6.4). One gun mount shall be proof fired in a free air environment to ensure

the gun mount functioning. The gun mount shall then be subjected to a dynamic environment with the sand and dust dispersed at a rate of 100 ±25 grams per minute per square meter blown across the test area. In this environment, 3 rounds shall be proof fired without malfunction.

TABLE X. Chemicals, petroleum, oil, and lubricants.

Lubricant, LSA 1/	Hydraulic fluid, petroleum, ANSI/NFPA T2.13.7
Lubricating oil, SAE AMS 3054	Antifreeze, multi engine type, type I, A-A-52624
Hydraulic fluid, fire-resistant, SAE J1447	Lubricating oil, ASTM D4175
Gasoline, automotive combat, SAE J312	Turbine fuel, ASTM D 1655
Diesel fuel, SAE J313	Lubricating oil, SAE J300
Chemical agent decontaminate, DS2 2/	Chemical agent decontaminate, STB 3/

NOTES:

1/ Lubricant, LSA, consists of the following materials in the proportions by weight indicated: Lithium stearate, 8.0 ±0.3%; lubricate-grade bis(2-ethylhexl)sebacate, 89 ±1.0%; diisopropyl phosphate, 1.0 ±0.2%; 2,6 di-tertary butyl-p-crsol, 0.5 ±0.1%; oil-free barium dinonylnaphthalene sulfonate, 1.5 ±0.3%.

2/ Chemical agent decontaminate, DS2, consists of the following materials in the proportions by weight indicated: Diethylenetriamine, 69-71%; sodium hydroxide (ACS grade except the sodium carbonate content is no greater than 0.5% by weight), 1.9-2.1%; and ethylene glycol monomethyl ether, the remaining weight.

3/ Chemical agent decontaminate, STB, consists of the following materials in the proportions by weight indicated: calcium oxide, 6.6 ±0.1%; and bleaching powder (chlorinated lime) having a maximum moisture content of 1.0% by weight (Do not substitute calcium hypochlorite for the bleaching powder), the remaining weight.

4.8.4 Altitude simulation. A gun mount shall be subjected to a pressure of 10 psi absolute for a minimum of one hour. Three rounds shall then be proof fired at the simulated altitude without malfunction (see 3.6.5).

4.8.5 Fungus resistance verification. The fungus resistance requirement shall be satisfied by one of the two methods as specified in 4.8.5.1 and 4.8.5.2 (see 3.6.6).

4.8.5.1 Fungus resistance demonstration. Fungus resistance shall be determined in accordance with ASTM G21.

4.8.5.2 Fungus resistance materials analysis. The gun mount shall be verified by analysis or evaluation to contain only fungus inert materials or treated materials to make fungus inert or resistant.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by

DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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 that may be helpful, but is not mandatory.)

6.1 Intended use. This hydrospring gun mount is military unique because it is specially designed to interface with the 120MM: M256 Tank Gun in the Abrams Series Tanks.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. If required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
c. Any additional or extended examinations and tests beyond the scope of this specification.
d. When first article is required (see 3.1).
e. If sample is proof fired in accordance with the sampling plan (see 3.3.3).
f. Requirements for the M256 interface (see 3.4.1).
g. Serial numbers for the gun mounts (see 3.5.2).
h. If alternative test methods may be used (see 4.2.1).
i. If first article inspection should be other than as specified (see 4.3).
j. If different first article proof firing measurements and/or meet requirements (see 4.3.1).
k. If different first article proof firing in climatic conditions (see 3.6.1 and 4.3.1.1).
l. If there are different examinations and tests from conformance inspection (see 4.4).
m. If there is a different sampling plan for proof firing (see 4.5.3).
n. If there is a different test configuration for proof firing (see 4.3.5.1).
o. If less than 100% of hydraulic simulation testing is needed (see 4.5.4).
p. If the test configuration is other than the contract (see 4.5.4).
q. Packaging requirements (see 5.1).

6.3 Simulation testing. General information regarding mechanical gymnasticators or hydraulic simulators is available from the Commanding Officer, ATTN: SMCRI-APA, Rock Island Arsenal, Rock Island, IL 61299-5000. Simulators may be qualified through utilization with two gun mounts successfully meeting the requirements of first article inspection and through utilization with the "i" (see 6.2) quantity of gun mounts successfully meeting the requirements of conformance inspection. Simulation data should correlate with fully

instrumented proof firing data as approved by the Engineering Design Agency. Simulation/sampling should not be used for proof acceptance prior to written approval from the Project Manager, Abrams Tank System.

6.4 First article. When requiring a first article inspection, contracting document should provide specific guidance to offerors. This guidance should cover whether the first article is a first article sample, a first production item, and the number of test items. These documents should also include specific instructions regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Pre-solicitation documents should provide Government waiver rights for samples for first inspection to bidders offering a previously acquired or tested product. Bidders offering such products who wish to rely on such production testing should furnish evidence with the bid that prior Government approval is appropriate for the pending contract.

6.5 Conformance inspection. Affordable conformance inspection with confidence varies depending upon a number of procurement risk factors, including: Contractor past performance, government schedules and budget, product materials and design maturity, manufacturing capital equipment and processes applied, the controlled uniformity of those processes, labor skill and training, and the uniformity of measuring processes and techniques. During the solicitation, contracting documents should indicate those tests desired from table VII and their designated frequency based on a risk assessment for the procurement.

6.6 Definitions.

6.6.1 Proof firing. For purposes of clarity, proof firing is the term used when reference is made to actual live firing only.

6.6.2 Simulation testing. For purposes of clarity, simulation testing and simulated firing cycles are terms used when reference is made to simulation only.

6.6.3 Firing. For purposes of clarity, firing and firing cycles are terms used when reference is made to both proof firing and simulation testing.

6.6.4 Acceptance level.

a. Prior to testing, the gun mount should be properly filled with the hydraulic fluid specified for the intended application.
b. The elevation levels specified may be adjusted due to environmental chamber limitations. Elevation tolerance is ±2 degrees.
c. The 100-SS or Super Slug (SS) round consists of a 28.8 lbs projectile assembled to combustible case with an adjusted charge weight of approximately 17.9 lbs of M30 propellant temperature conditioned for 24 hours at 70 ±2 °F. The anticipated nominal muzzle velocity for this adjusted charge weight cartridge is 4500 ±20 fps with an anticipated total impulse of 7,374 lb-sec and a chamber pressure of 100,000 psi.

Super Slug testing will only be fired from "facility tubes"; no production (i.e., to be fielded) tubes will be used, since Super Slugs are damaging to the bore's chrome.

(1) Warning 1: Super Slug will not be Temperature Conditioned higher than 70 ±2 °F.

(2) Warning 2: The Chamber Pressure of the Super Slugs will be verified on the first high pressure round fired for the day to assure that they are at the expected value. If this pressure exceeds 102,000 psi, then the other rounds to be fired for the day will have the charge weight adjusted down, to bring the cartridge to the expected pressure level.

d. The 113-CPS or Cannon Proof Slug (CPS) round consists of a round which may be charge weight adjusted and temperature conditioned to provide a chamber pressure level range of 97,000 to 102,000 psi (688,815 to 703,290 kPa) at the 113-CPS acceptance level. When temperature conditioning the round, the elevated temperature should not exceed +145 °F. Should the 113-CPS round not achieve "excess" pressure, another "excess" pressure round will be fired. The 100-CPS acceptance level requires a chamber pressure of approximately 88,100 psi. The 80-CPS is a round which has been downloaded (approximately 80% of the propellant charge weight of the standard 100-CPS).

e. Additional information is contained in the TECOM PROVING GROUND ACCEPTANCE TEST PROCEDURE FOR M1A1 TANK GUN MOUNTS.

6.7 Subject term (key word) listing.

Ejection
Firing
Gymnastication
Hydrospring
M1A1 tank

6.8 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.

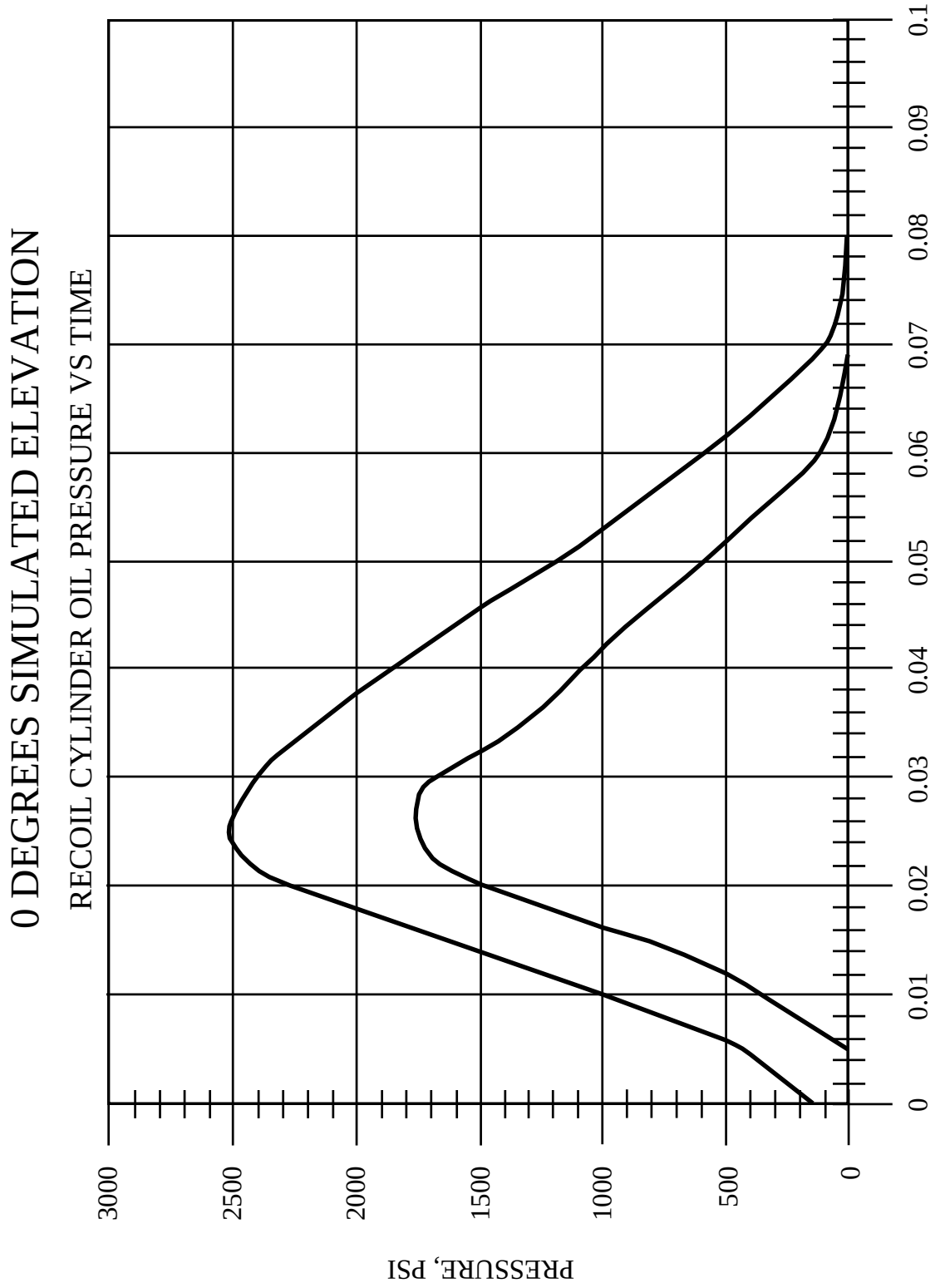

FIGURE 1. Recoil cylinder - 0 degrees.

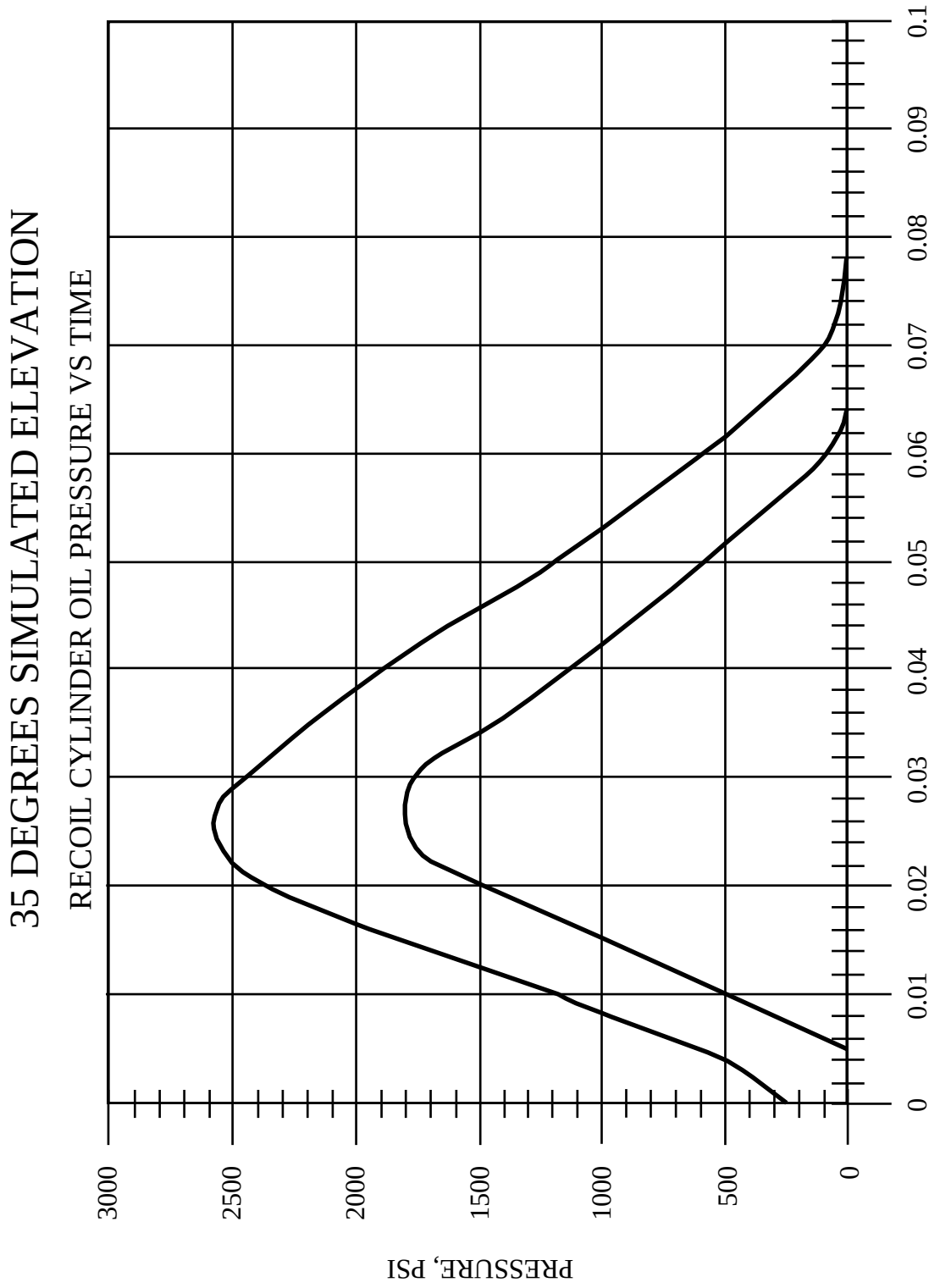

FIGURE 2. Recoil cylinder - 35 degrees.

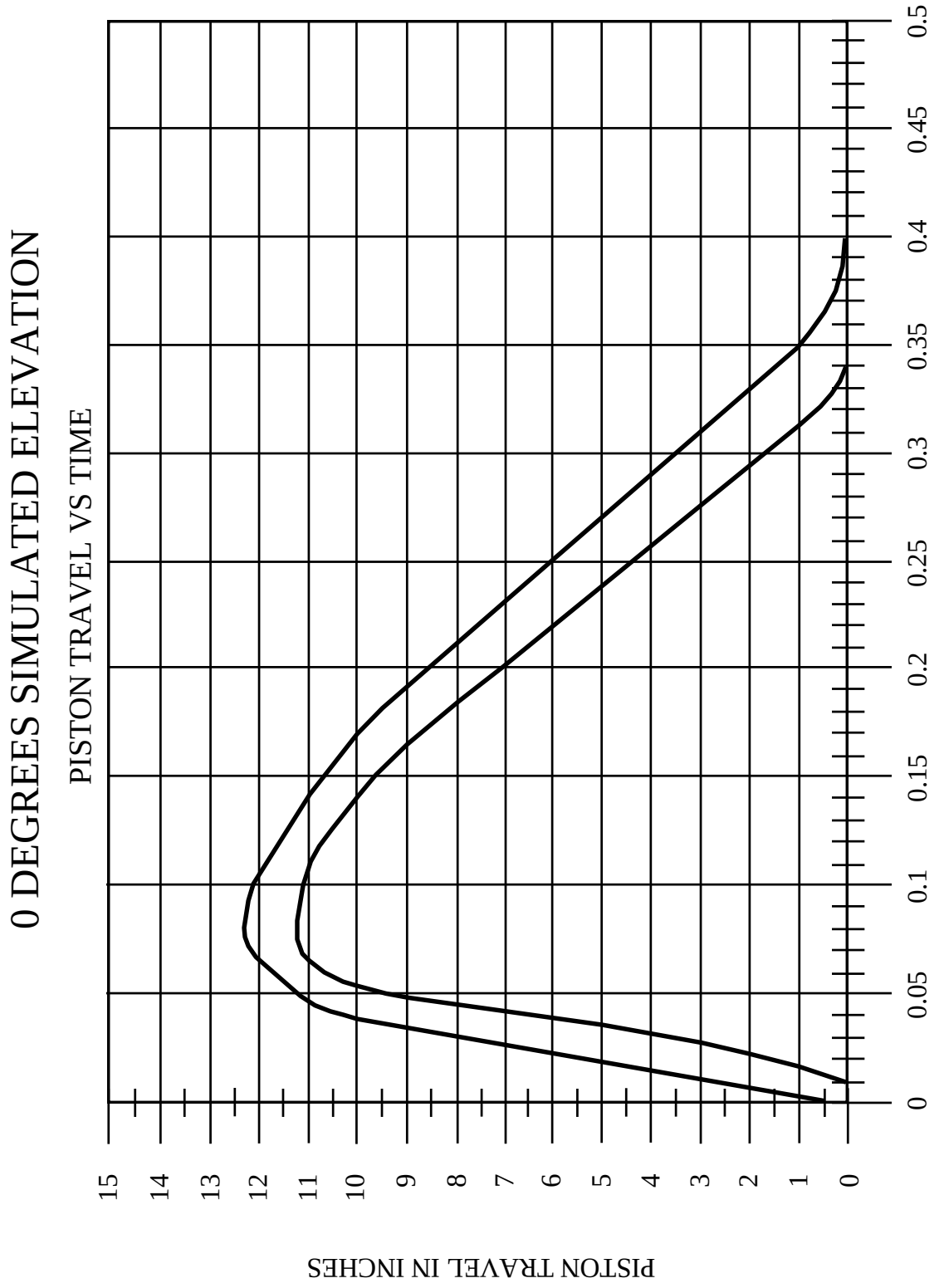

FIGURE 3. Piston Travel - 0 degrees.

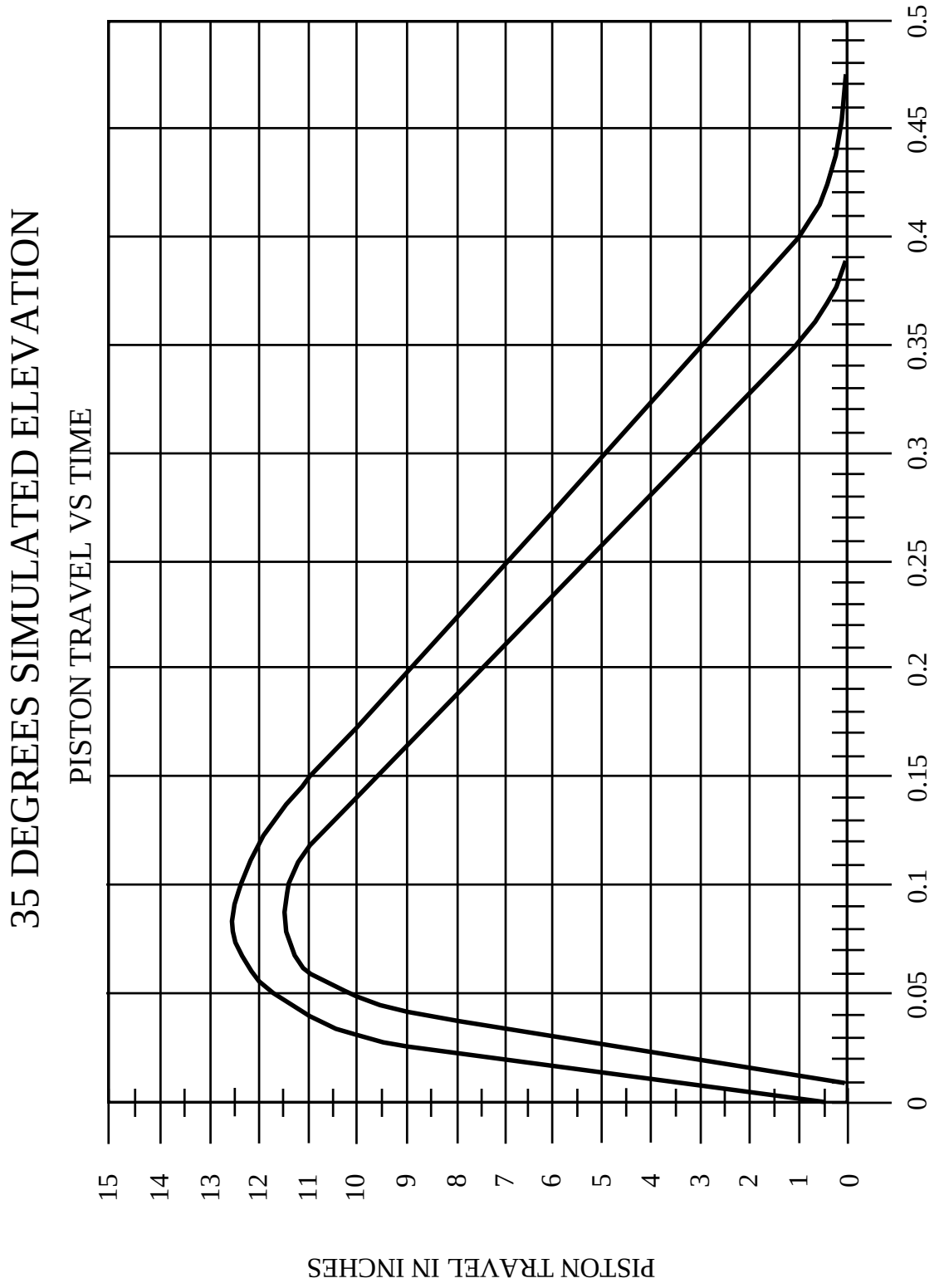

FIGURE 4. Piston Travel - 35 degrees.

Custodian:
Army - AT

Review activities:
Army - AR

Preparing Activity:
Army - AT

(Project 1015-2010-001)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.daps.dla.mil.