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USATECOM Project No. 8-8-0200-07
Report No. DPS-2675

FINAL REPORT ON

INITIAL PRODUCTION TEST

OF

CHROME-PLATED CHAMBERS FOR 5.56-MM, M16A1 RIFLES

BY

FRANKLIN H. MILLER

FEBRUARY 1968

ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND

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DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND MARYLAND 21005

AMSTE-BC

15 MAR 1968

SUBJECT: Final Report on Initial Production Test of Chrome Plated Chambers for 5.56mm M16A1 Rifles, USATECOM Project No. 8-8-0200-07

TO: Commanding General
US Army Materiel Command
ATTN: AMCPM-RS
Rock Island, Illinois 61200

1. References:

a. Letter, AMSTE-BC, dated 7 Dec 67, approving Test Plan for above test.

b. Letter, AMSTE-BC, dated 19 Jan 68, with inclosed Letter Report, dated 20 Dec 67, which in essence contained the same information as subject letter.

c. Operational Reliability Test M16A1 Rifle System, WSEG Report 124, dated February 1968.

2. Forwarded herewith are approved copies of subject report.

3. It should be noted that IMR propellant loaded cartridges were not utilized in this test. Two Quality Assurance (QA) test programs are scheduled, one using IMR propellant loaded ball cartridges and the other using ball propellant loaded cartridges. Weapons will have chrome plated chambers. Results from this test in conjunction with the QA test results, past and present, should provide an additional basis for comparison of weapon performance when using both types of propellant loaded cartridges.

4. Due to the high frequency of failures to strip the first round in 20 round loaded magazines during the dust test, a follow-on limited test was conducted at the request of this command. The purpose was to evaluate weapon performance with magazines loaded to 18 and 20 rounds. Within test constraints, the data, Appendix I (pages I-46 thru I-49), indicates that no significant difference exists in weapon performance with respect to failure to feed first rounds from magazines (18 or 20) when subjected to adverse dust conditions.

SUBJECT: Final Report on Initial Production Test of Chrome Plated Chambers for 5.56mm M16A1 Rifles, USATECOM Project No. 8-8-0200-07

5. As stated in ref 1b, your attention is directed to an analysis and graphical presentation of the variability in cyclic rate and malfunctions over the 10,000 round durability test broken out by order of fired magazine (reference Appendix I, pages I-37 thru I-43).

6. Review of the WSEG Report revealed that there were ejection problems with weapons possessing chrome plated chambers, i.e., 33 percent of the malfunctions with chromed chambers were failures to eject. This phenomenon was not encountered in the attached test; therefore, CO, APG was directed by this command to evaluate and document the ejection process during the Quality Assurance Test Programs.

7. The conclusions and recommendations of this command are as follows:

a. Conclusions: It is concluded that

(1) Chrome plated chambers are superior to non-plated chambers in avoiding failures to extract (FX) under dust and saltwater environments; however, with regard to other types of malfunctions, performance of weapons with and without chrome plated chambers is comparable

(2) The chrome plating of the M16A1 Rifle chamber is subject to deterioration if not properly maintained following exposure to saltwater combined with a high temperature and high humidity environment.

(3) Chrome plated chambers can be expected to perform satisfactorily for 10,000 rounds of firing with normal maintenance.

(4) The use of silica flour dust, although it imposes more severe test conditions than the representative dust samples from Vietnam, is valid for testing purposes.

(5) Weapon performance under adverse dust conditions is not significantly improved with respect to stripping first round from magazine in magazines loaded to 18 rounds instead of 20 rounds.

b. Recommendations: It is recommended that

(1) The chrome plating of M16A1 Rifle chambers be considered for adoption.

(2) Investigation be made to determine if the quality of the chrome plating can be improved to resist the tendency of spot pitting which causes failure of the plating when exposed to saltwater combined with high temperature and high humidity environments.

AMSTE-BC

15 MAR 1968

SUBJECT: Final Report on Initial Production Test of Chrome Plated Chambers for 5.56mm M16A1 Rifles, USATECOM Project No. 8-8-0200-07

(3) The malfunction of first round failure to strip from a fully loaded magazine be investigated but additional test of 18 versus 20 round loaded magazines does not appear warranted and should not be pursued further.

FOR THE COMMANDER:

Robert B Tully

ROBERT B. TULLY
Colonel, GS
Dir, Inf Mat Test Dir

1 Incl
as

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INITIAL PRODUCTION TEST OF CHROME-PLATED CHAMBERS FOR 5.56-MM, M16A1 RIFLES

FINAL REPORT

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FRANKLIN H. MILLER

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ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND
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ABSTRACT

Five M16A1 rifles equipped with chrome-plated chambers underwent an initial production test at Aberdeen Proving Ground, Maryland, from 8 November 1967 through 17 January 1968. The purpose of this evaluation was to determine plating durability and effects of the chrome-plated chambers upon weapon performance under adverse conditions. Static and dynamic dust tests, salt water immersion with storage at high temperature and humidity, and 10,000-round function and durability tests were performed. Performance of the plated chambers was superior to that of nonplated chambers in adverse conditions tests and satisfactorily withstood the 10,000-round durability test.

FOREWORD

Development and Proof Services was responsible for preparing the test plan outline, conducting the test, and preparing the test report.

ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND 21005

USATECOM PROJECT NO. 8-8-0200-07

FINAL REPORT ON INITIAL PRODUCTION TEST OF CHROME-PLATED CHAMBERS FOR 5.56-MM, M16A1 RIFLES

8 NOVEMBER 1967 TO 17 JANUARY 1968

SECTION 1. INTRODUCTION

1.1 BACKGROUND

Previous evaluations by USATECOM test agencies and the military services indicate that, under severe adverse conditions and lack of correct maintenance, the chamber of the M16A1 rifle becomes roughened due to abrasion and rust-pitting. This deterioration contributes to fired-case extraction failures. For this reason, the chamber area has been chrome-plated to improve weapon performance by preventing chamber deterioration.

1.2 DESCRIPTION OF MATERIEL

Seven new M16A1 rifles were allocated for initial production testing. Five were equipped with chrome-plated chambers and two with nonplated chambers. All weapons were equipped with the new design buffer (action spring guide) and phosphate-coated bolt and carrier assemblies.

The ammunition used in this test was 5.56-mm ball, M193, loaded with ball-propellant. The two lots used were TW-18125 (all subtests) and RA-5273 (function and durability subtest only).

1.3 TEST OBJECTIVE

The over-all objective was to determine the relative performance levels of weapons with chrome-plated and nonplated chambers when subjected to adverse conditions and to determine if extended firing deteriorates the plating.

1.4 SUMMARY OF RESULTS

1.4.1 Inspection

The materiel was inspected throughout the entire evaluation to ascertain the durability of the chamber plating. The inspections revealed the following:

a. The chrome plating was not adversely affected by dust abrasion.

b. Salt water contamination introduced into the chamber during the 10-day high temperature humidity test did cause some deterioration of the plating. This deterioration did not affect fired-case extraction and therefore is a marked improvement when compared with nonplated chamber weapons. Surface deterioration of the nonplated chambers caused an average head space increase of 0.0035 inch.

c. The plating satisfactorily withstood 10,000 rounds of firing during the function and durability test.

1.4.2 Static Dust Test

This subtest was conducted with four weapons, two with chrome-plated chambers and two with nonplated chambers. The malfunctions encountered with all weapons were type I (clearable by appropriate immediate action of using the bolt-closure-assist device or retraction of the charging handle). The malfunction rate average for weapons with plated and nonplated chambers was 3.4 and 4.1 per hundred rounds respectively. The malfunctions which occurred were of types not directly related with chamber performance. However, increased extraction forces, as demonstrated by partial rim shears, were encountered with the nonplated chambers (Figures 2.3-1 through 2.3-5).

1.4.3 Dynamic Dust Test

This test demonstrated the improved capability of the plated chamber weapons to prevent the rim shear (failure to extract) malfunctions associated with dusty environments. During this subtest there were no instances that indicated a condition of increased extraction force (partial rim shear) was present with the plated-chamber weapons. Partial and complete rim shears were experienced with nonplated-chamber weapons. The type I malfunctions associated with this test cannot be directly related to the chamber plating or lack of it.

To evaluate the relative severity of the standard 140-mesh silica flour used for all dust testing at Aberdeen Proving Ground, three soil

samples indigenous to Viet Nam were included in the test. The soil samples came from the Pleiku, Lai-Khe and Cam Ranh-Bay areas. From the results of the test given in Table 1.4-I, it is evident that the silica flour is an adequate test medium for simulating severe dust environments.

Table 1.4-I. Average Malfunction Rate per 100 Rounds for Three 140-Round Trials per Weapon

Weapon No.[a]	Dust and Malfunction Type									
	Silica Flour		Pleiku		Lai-Khe		Cam Ranh-Bay		Silica Flour[b]	
	I[c]	II[d]	I	II	I	II	I	II	I	II[d]
1	5.5	0.0	0.0	0.0	0.0	0.0	0.24	0.0	2.9	0.0
2	5.0	.0	.0	.0	.0	.0	.48	.0	1.4	0.0
6	5.0	.0	.0	.0	.71	.0	.24	.0	4.8	4.8
7	5.8	.26	.27	.0	.95	.0	.0	.0	5.0	0.0

[a]Weapons 1 and 2 with chrome-plated chambers, 6 and 7 with nonplated chambers.
[b]Only one 140-round trial with each weapon.
[c]Type I malfunctions are clearable by appropriate immediate action.
[d]Type II malfunctions are not clearable by immediate action (these were rim shears).

1.4.4 Salt Water Immersion, High Temperature - Humidity Test

Table 1.4-II gives the function performance relative to extraction failures and effects of the test environment on the plated and nonplated chambers. Weapon malfunctions not considered associated with chamber performance are listed in Appendix I.

Table 1.4-II. Salt Water Immersion, High Temperature and Humidity Test Data

APG Wpn No.	Cyclic[a] Rate, rd/min	No. Rds Fired	Type II Malfunct, FX	Chamber Condition
Test Day: 1.				
b1	796	100	0	Clean.
2	857	100	0	Clean.
b6	808	100	0	Clean.
7	834	100	0	Clean.

See footnotes on page 4.

Table 1.4-II (Cont'd)

APG Wpn No.	Cyclic[a] Rate, rd/min	No. Rds Fired	Type II Malfunct, FX	Chamber Condition
Test Day: 3.				
[b]1	644	20	0	-
2	814	20	0	Light rust "beads."
[b]6	752	20	1	-
7	740	20	0	Heavy over-all rust.
Test Day: 6.				
[b]1	735	20	0	-
2	756	20	0	Light rust "beads".
[b]6	689	20	0	-
7	768	20	1	Heavy over-all rust.
Test Day: 10.				
b1	768	40	0	[d]-
2	781	40	0	Medium rust "beads".
b6	719	40	0	[e]-
7	[c]806	40	0	Heavy over-all rust.

[a]Cyclic rates for the first 20 rounds fired (ref Appendix I).
[b]Weapon No. 1 (chrome-plated) and No. 6 (nonplated) were stored with chambered cartridge (weapon No. 2 also chrome-plated, No. 7 nonplated).
[c]Weapon had to be flushed with water and lubricated to obtain satisfactory operation.
[d]After-cleaning inspection revealed removal of plating from approximately 30% of chamber and light pitting was evident.
[e]Pitting of most of chamber surface.

1.4.5 Function and Durability Test

Three weapons equipped with chrome-plated chambers were fired 10,000 rounds each in this subtest. All firings were conducted in 100-round cycles. Table 1.4-III gives function performance data with respect to malfunction types for the first 6000 rounds fired and last 4000 rounds fired with each weapon. Table 1.4-IV gives the combined malfunction rates for three weapons, by magazine-firing sequence and malfunction-type classification.

Table 1.4-III. Function and Durability Test Data, 10,000 Rounds per Rifle

Legend: S = Semiautomatic.
B = Bursts of 3 to 5 rounds.
A = 20-round bursts.

APG Wpn No.[c]	No. Rds Fired, thousands	Mode of Fire	Malfunctions by Type: Type I[a] FS1	FS	COEC	FC	FFR	FBR	Total	Malfunc per 1000 Rds	Type II[b] FTR	BOB-DF	DF	FJ	Total	Malfunc per 1000 Rds	Avg Cyclic Rate, rd/min
3	1 to 6	S	0	1	0	0	0	1	2		0	0	0	0	0		
		B	0	3	1	0	0	0	4		0	0	0	0	0		
		A	0	1	1	0	0	0	2		0	0	0	0	0		
	Subtotal		0	5	2	0	0	1	8	1.3	0	0	0	0	0	0.0	797
	7 to 10	S	0	0	0	0	0	0	0		0	0	0	0	0		
		B	0	1	0	0	0	1	2		0	0	0	0	0		
		A	0	0	0	0	0	1	1		0	1	0	0	1		
	Subtotal		0	1	0	0	0	2	3	0.75	0	1	0	0	1	0.25	724
	1 to 10 Total		0	6	2	0	0	3	11	1.1	0	1	0	0	1	0.1	768
4	1 to 6	S	0	0	0	0	0	4	4		0	0	0	0	0		
		B	0	0	0	0	0	4	4		0	0	1	0	1		
		A	0	1	0	1	0	4	6		0	0	0	0	0		
	Subtotal		0	1	0	1	0	12	14	2.3	0	0	1	0	1	0.2	810
	7 to 10	S	0	0	0	0	0	4	4		0	0	0	0	0		
		B	0	0	0	0	0	4	4		0	0	0	0	0		
		A	0	0	0	0	0	6	6		0	0	0	0	0		
	Subtotal		0	0	0	0	0	14	14	3.5	0	0	0	0	0	0.0	783
	1 to 10 Total		0	1	0	1	0	26	28	2.8	0	0	1	0	1	0.1	799
5	1 to 6	S	1	0	0	0	1	0	2		0	0	0	0	0		
		B	0	5	0	1	0	0	6		0	0	0	1	1		
		A	0	0	0	1	0	0	1		0	1	0	4	5		
	Subtotal		1	5	0	2	1	0	9	1.5	0	1	0	5	6	1.0	813
	7 to 10	S	0	0	0	0	0	0	0		2	0	0	0	2		
		B	0	0	0	0	0	0	0		0	0	0	0	0		
		A	0	0	0	0	0	1	1		0	0	0	1	1		
	Subtotal		0	0	0	0	0	1	1	0.25	2	0	0	1	3	0.75	777
	1 to 10 Total		1	5	0	2	1	1	10	1.0	2	1	0	6	9	0.9	798
3-weapon total			1	12	2	3	1	30	49	1.6	2	2	1	6	11	0.37	

[a]Clearable by immediate action.
[b]Not clearable by immediate action.
[c]Chrome-plated chambers.

Note: Weapons were maintained at 1000-round intervals.

Table 1.4-IV. Malfunction Rates for Three Weapons with Chrome-Plated Chambers Fired 10,000 Rounds Each

Magazine No.[a]	Sequence[b]	Total Rds Fired, All Modes	Malfunctions by Type, All Modes			Malfunction Rate per 1000 Rds		
						By Type		All Modes
			I	II	Total	I	II	Total
3	First	6000	25	3	28	4.17	0.50	4.67
3	Second	6000	8	1	9	1.33	.17	1.50
3	Third	6000	7	2	9	1.17	.33	1.50
3	Fourth	6000	7	2	9	1.17	.33	1.50
3	Fifth	6000	2	3	5	0.33	.50	0.83
Total 15		30000	49	11	60	1.63	0.37	2.00

[a]Each magazine was loaded 100 times. Section 3 shows measurements taken during test.

[b]Malfunction data were separately recorded for each 1st through 5th 20-round magazine fired in each 100-round cycle. Weapons were cooled to ambient range temperature between cycles.

[c]Type I malfunctions are clearable by immediate action. Type II malfunctions are not clearable by immediate action and may require disassembly or use of tools to rectify. (No failures to extract occurred.)

During evaluation of weapon performance data, it became apparent that the three weapons characteristically exhibited patterns of cyclic rate performance as follows:

a. Increase of cyclic rate from first to last 20-round burst in each 100-round cycle.

b. The last 20-round burst fired in the 100-round cycle prior to weapon maintenance (each 1000 rounds) is lower than the first 20-round burst fired after maintenance.

c. Decrease of average cyclic rate (after 1000 rounds) to a low-rate point at approximately 6600 to 7600 rounds. After attaining this low-rate point, the rate increased for the remainder of the testing (to 10,000 rounds).

A discussion of these cyclic-rate characteristics, including charts, is contained in Appendix I.

Results of additional testing requested by USATECOM are given in Appendix I. This test consisted of obtaining stripping characteristics for 18- and 20-round-loaded magazines, in clean and dust-contaminated conditions.

1.5 CONCLUSIONS

It is concluded that:

a. Chrome-plated chambers effectively eliminated failures to extract in the dust and salt water environment tests (ref par. 1.4.3 and Tables I.4-I and 1.4-II).

b. The chrome-plated chamber is more durable than the non-plated chamber when subjected to salt water corrosion (ref Table 1.4-II).

c. Chrome-plated chambers can be expected to perform satisfactorily for 10,000 rounds under normal usage and normal maintenance (ref Tables 1.4-III and 1.4-IV).

1.6 RECOMMENDATIONS

It is recommended that:

a. Chambers of future-production M16A1 rifles be chrome-plated.

b. Investigation be made to determine if the quality of the chrome plating can be improved to resist the tendency of spot-rust pitting caused by exposure to salt water in a high temperature and high humidity environment.

SECTION 2. DETAILS OF TEST

2.1 INTRODUCTION

The purpose of this initial production test was to evaluate the performance of M16A1 rifles equipped with chrome-plated chambers under Southeast Asia (SEA) environmental and usage conditions.

A supplementary evaluation of first-round failures to strip from the magazine was requested by letter from USATECOM. As a cursory check, it was desired to ascertain if there was any advantage in loading 18, as opposed to 20, rounds in the magazine. Details of this test are included in Section 3.

In the malfunction legend which follows, malfunctions are identified as type I (clearable by appropriate immediate action) and type II (not clearable by appropriate immediate action and may require disassembly of the weapon and use of tools to rectify). This legend applies to the entire report.

Any number after a letter designation (i. e., FBR-20) indicates the round number within the magazine at which the malfunction occurred.

The classification of malfunctions by type is based on the clearing action taken by test personnel after the malfunction has been studied, identified, and the correct remedial action determined. These classifications are, therefore, not necessarily indicative of the relative difficulty of clearing the various malfunctions under field conditions or combat stresses. Improper clearing action applied to some type I malfunctions can create a type II malfunction.

LEGEND

Malfunction, Type I

STUB-1 = The projectile méplat of the top round in a fully-loaded magazine contacts the top front portion of the magazine or the face of the receiver adjacent to the feed ramp.

FS1 = Failure to strip the first round from a fully-loaded magazine.

FS = Failure to strip (other than first round from magazine).

FC = Failure to chamber undamaged round. Caused by retardation of bolt and carrier due to fouling or introduction of external fouling (dust) into the chamber.

COEC = Bolt closes on empty chamber after ejecting fired case.

FFR = Failure to fire chambered cartridge.

FBR = Failure of the bolt to remain rearward after last round is fired.

Malfunctions, Type II

FTR[a] = Failure of the trigger to return forward after initial pull.

BOB-DR = The bolt overrides the base of the cartridge. Deformation of the cartridge case created during the chambering cycle.

DF = Double feed. The cartridge beneath the one being fed into the chamber is partially stripped from the magazine and wedges between the round partially chambered, feed ramp, and the magazine feed lips.

FX = Failure to extract fired case from the chamber. Characterized by partial or complete shearing of the cartridge case rim at point of extractor contact.

FJ = Failure to eject fired case. Fired case becomes wedged between partially chambered round and forward part of charging handle.

[a]Type I in clearance procedure, but was classed type II because of difficulty experienced by gunner in identifying origin of weapon stoppage.

2.2 INITIAL INSPECTION

2.2.1 Objective

To determine the condition of test and support materiel prior to initiation of tests.

2.2.2 Criteria

The test and support materiel must be in serviceable condition.

2.2.3 Method

Visually inspect the materiel for manufacturing defects. Take measurements of head space, firing pin protrusion, and barrel bore and groove diameters. Take chamber measurements from casts made from a stable casting composition. Function-fire each weapon 100 rounds in five 20-round bursts and record cyclic rate.

2.2.4 Results

Visual inspection, chamber and bore measurements, and firing pin protrusion and head space measurements indicated that all test and control weapons were in serviceable condition. However, weapon No. 3 was equipped with a gas tube which did not have a gas-check "button" at the end that enters the carrier key. The elimination of this button reduced the tube diameter at that point by 0.013 inch. Figure 2.6-1 shows gas tube comparison. Head space and firing pin protrusion measurements are given in Table 2.2-I. Cyclic rates of fire are given in Table 2.2-II. Bore and chamber dimensions are shown in Appendix I.

Table 2.2-I. Head Space and Firing Pin Protrusion for All Weapons

APG Weapon No.	Weapon Serial No.	Chrome-Plated Chamber	HSP Go-Gage Length[a], in.	FPP[b], in.
1	823316	Yes	1.4656	0.032
2	824652	Yes	1.4666	.032
3	825090	Yes	1.4656	.034
4	826757	Yes	1.4656	.033
5	832375	Yes	1.4666	.031
6	786642	No	1.4656	.032
7	788846	No	1.4666	.034

[a]Maximum allowable length is 1.4730 inch for field serviceability.
[b]Minimum - maximum protrusion is 0.028 to 0.036 inch.

HSP = Head space.
FPP = Firing pin protrusion.

Table 2.2-II. Weapon-Inspection Firing Prior to Start of Subtests

APG Weapon No.	Chrome-Plated Chamber	No. Rds Fired	Mode of Fire[a]	APG Magazine Nos.	Magazine Sequence by Cyclic Rate of Fire, rd/min					
					First	Second	Third	Fourth	Fifth	Avg
1	Yes	100	A	1 to 5	730	772	791	832	863	798
2	Yes	100	A	6 to 10	816	853	887	921	940	883
3	Yes	100	A	1 to 5	804	844	883	912	926	874
4	Yes	100	A	6 to 10	808	844	873	893	917	867
5	Yes	100	A	11 to 15	811	853	883	904	928	876
6	No	100	A	11 to 15	767	820	842	861	863	831
7	No	100	A	16 to 20	804	847	904	926	940	884

[a]Fired in five 20-round automatic bursts (A) for determination of cyclic rate.

In addition to weapon inspection, all magazines were measured for feed lip width (Appendix I).

2.3 STATIC DUST TEST

2.3.1 Objective

To determine if chamber-plating improves weapon performance during firing of dust-contaminated ammunition.

2.3.2 Criteria

Performance of weapons with chrome-plated chambers must be comparable to or better than weapons with nonplated chambers with regard to chamber-related malfunctions. Dust abrasion must not render the plating unserviceable.

2.3.3 Method

Use two rifles with plated and two with nonplated chambers. Subject 20 new, fully-loaded magazines to dust in accordance with TECP 700-700, Interim Pamphlet 20-20, except that 140-mesh silica flour is used and the magazines are positioned vertically with feed lips up during the five conditioning periods. The weapons are not exposed to the dust. Conduct test-firing in 100-round increments. Repeat the dust conditioning and firing trials a total of five times. Perform weapon maintenance only prior to the test. Clean and inspect the magazines after each firing. Progressively alternate the three modes of fire for each rifle (semiautomatic, 3- to 5-round automatic burst,

and 20-round automatic burst). Record the cyclic rate of fire for all 20-round automatic bursts. Inspect all fired cartridge cases for indications of high extraction forces and chamber abrasion.

2.3.4 Results

Visual inspection of the chambers indicated that neither the plated nor nonplated chambers were severely abraded by the dust. The function performance of the weapons is given in Table 2.3-I. Figures 2.3-1 through 2.3-5 compare the rim deformation on fired cases from weapons with plated and nonplated chambers. Round-by-round test data are given in Appendix I (silica flour dust only).

Table 2.3-I. Static Dust Test Function Data, 500 Rounds per Rifle

		Malfunctions, by Type										
		Type I[b]						Type II[c]				
APG Wpn No.[a]	Avg Cyclic Rate, rd/min	STUB-1	FS1	FS	FC	Total	Malfunct per 100 Rds	BOB-DR	DF	FX	FJ	Total
1	747	0	14	2	1	17	3.4	0	0	0	0	0
2	830	1	16	0	0	17	3.4	0	0	0	0	0
6	764	1	19	0	0	20	4.0	0	0	0	0	0
7	782	0	20	1	0	21	4.2	0	0	0	0	0

[a] Rifle Nos. 1 and 2 with plated chambers, Nos. 6 and 7 with nonplated chambers.
[b] Clearable by immediate action.
[c] Not clearable by immediate action.

2.3.5 Analysis

Since no failures to extract (type II malfunction) occurred during this subtest, the advantage of chamber-plating could be discerned only by visual inspection of fired cases. The unplated-chamber cases (Figures 2.3-1 through 2.3-5), definitely show the presence of increased extractive force which is not evident on cases from plated-chamber weapons.

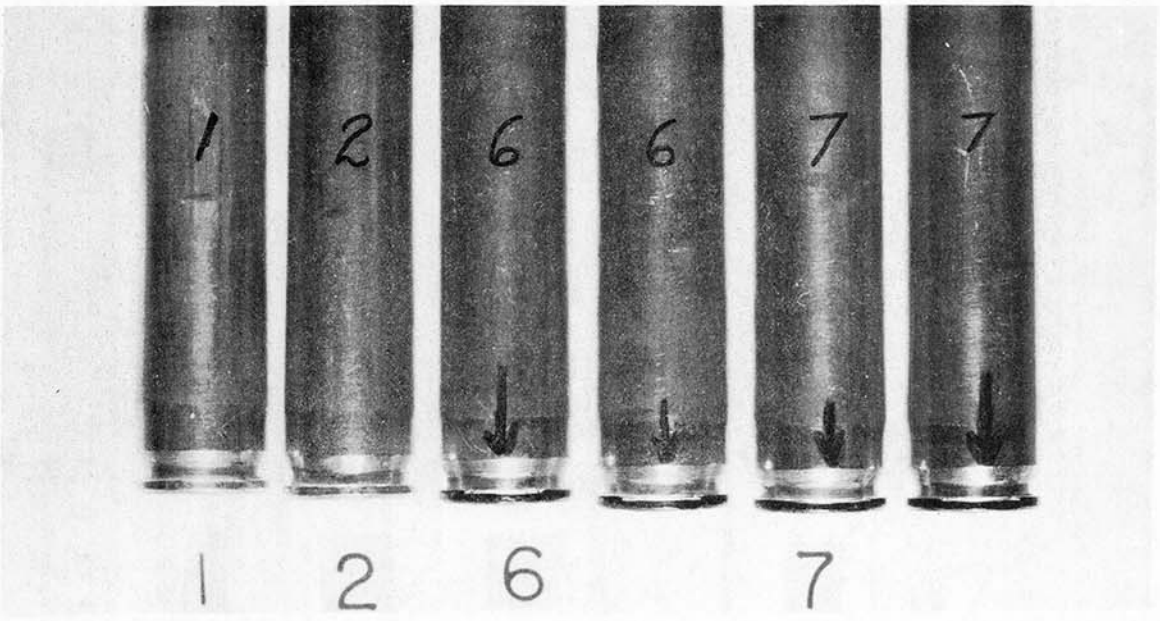

Figure 2.3-1: Fired Cases from Trial 1 of Static Dust Test Showing Rim Deformation due to Increased Extractive Force. Nos. 1 and 2 from Chrome-Plated Chambers, Nos. 6 and 7 from Nonplated Chambers (Numbers Correspond to Weapons).

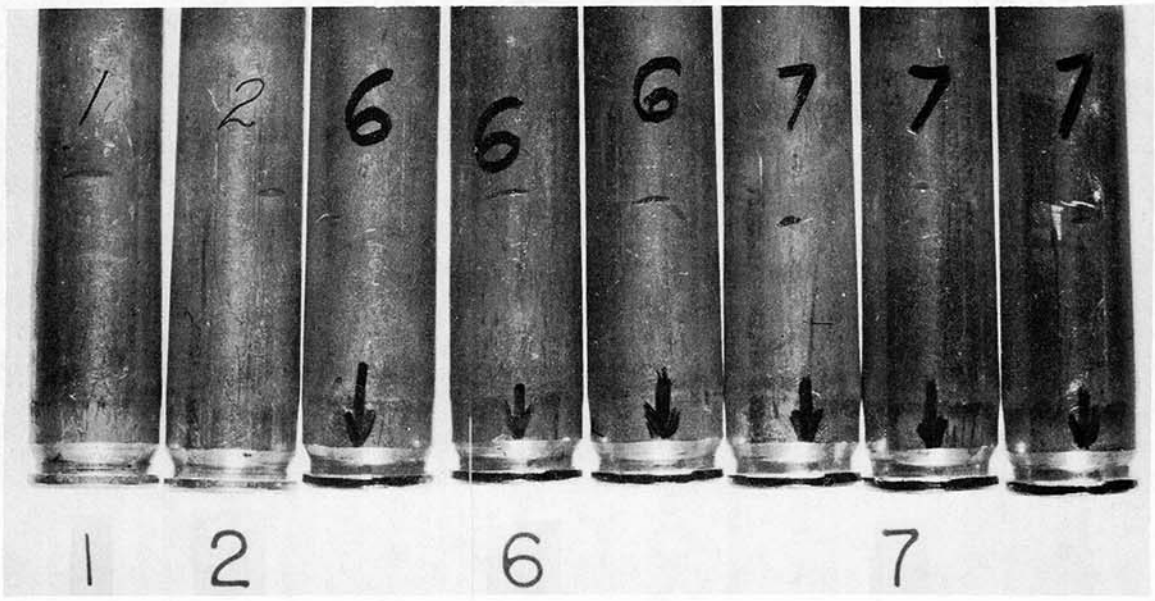

Figure 2.3-2: Fired Cases from Trial 2 of Static Dust Test Showing Rim Deformation due to Increased Extractive Force. Nos. 1 and 2 from Chrome-Plated Chambers, Nos. 6 and 7 from Nonplated Chambers (Numbers Correspond to Weapons).

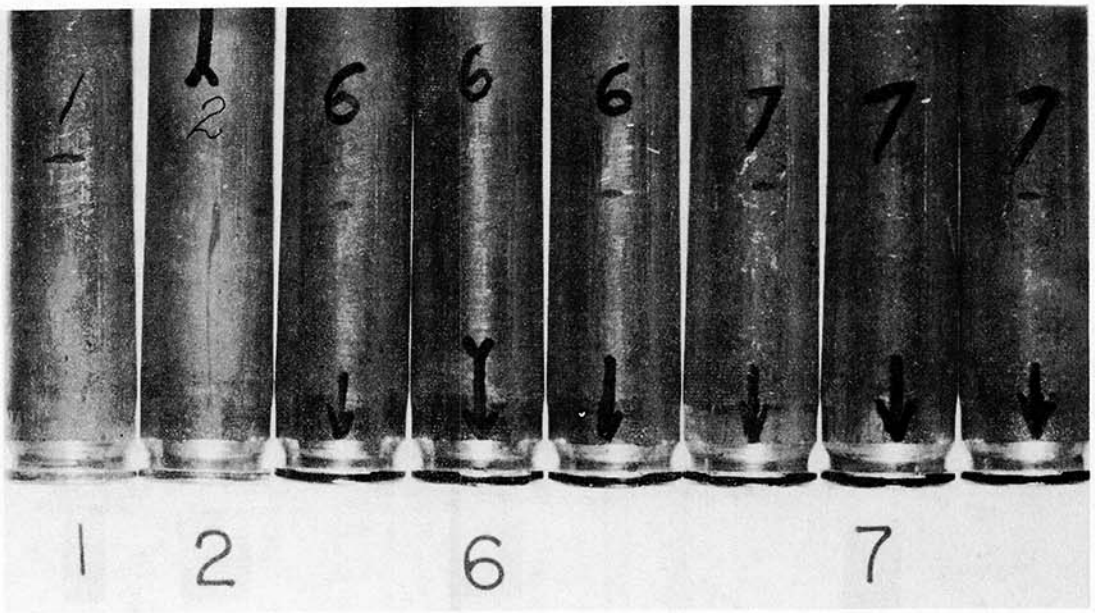

Figure 2.3-3: Fired Cases from Trial 3 of Static Dust Test Showing Rim Deformation due to Increased Extractive Force. Nos. 1 and 2 from Chrome-Plated Chambers, Nos. 6 and 7 from Nonplated Chambers (Numbers Correspond to Weapons).

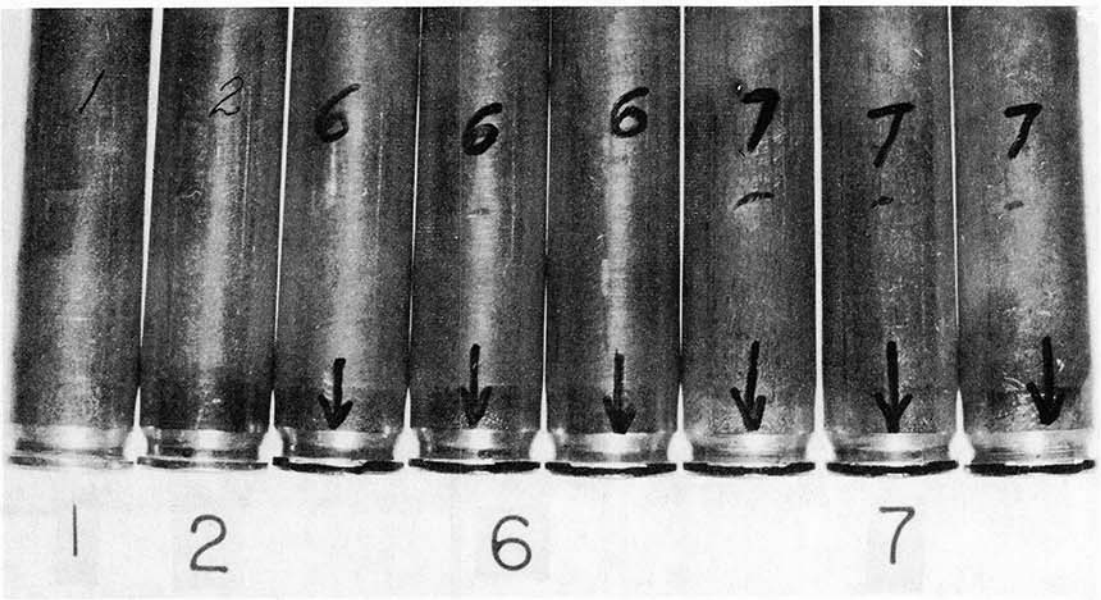

Figure 2.3-4: Fired Cases from Trial 4 of Static Dust Test Showing Rim Deformation due to Increased Extractive Force. Nos. 1 and 2 from Chrome-Plated Chambers, Nos. 6 and 7 from Nonplated Chambers (Numbers Correspond to Weapons).

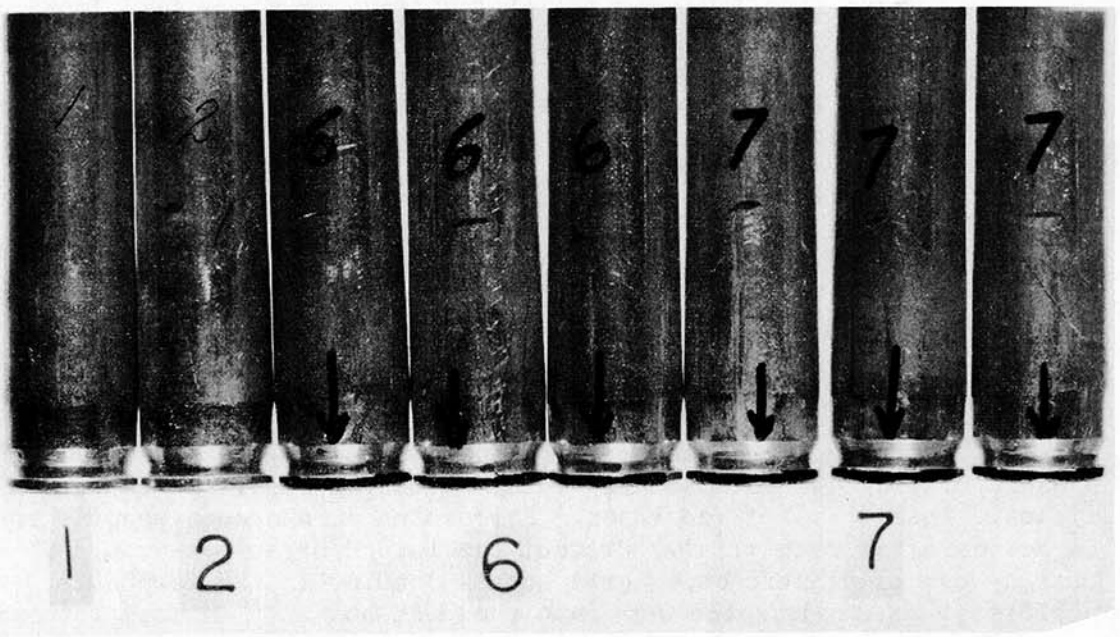

Figure 2.3-5: Fired Cases from Trial 5 of Static Dust Test Showing Rim Deformation due to Increased Extractive Force. Nos. 1 and 2 from Chrome-Plated Chambers, Nos. 6 and 7 from Nonplated Chambers (Numbers Correspond to Weapons).

2.4 DYNAMIC DUST TEST

2.4.1 Objective

To determine if chrome-plating the M16A1 rifle chamber improves function performance of the weapon during firing in a dust environment.

2.4.2 Criteria

The performance of weapons equipped with chrome-plated chambers must be comparable to or better than weapons with nonplated chambers. Dust abrasion must not render the plating unserviceable.

2.4.3 Method

Perform the following test phases with the four M16A1 rifles previously used in the static dust test:

a. Phase I. Three trials of standard test dust (140-mesh silica flour).

b. Phase II. Three trials of low-grade iron ore soil from Pleiku, Viet Nam.

c. Phase III. Three trials of whitish-gray dust from Lai-Khe, Viet Nam.

d. Phase IV. Three trials of fine sand from Cam Ranh-Bay, Viet Nam.

e. Phase V. One trial of standard test dust (140-mesh silica flour).

Conduct all firing in 20-round automatic bursts, 140 rounds per trial. Record cyclic rate of fire and magazine change times for each trial. Obtain cyclic rates of all weapons prior to the start of each phase by firing 140 rounds in 20-round automatic bursts in the clean rifles. Inspect all fired cases. Perform maintenance on weapons and magazines after each trial. Protect the loaded magazines from the dust by use of plastic bags until actual loading in the weapon is performed. Introduce the dust into the dust box at a uniform rate of 2 pounds per minute. Accomplish dust ciruclation by manual operation of the blower (ref TECP 700-700, Interim Pamphlet 20-20 for dust test procedures). After completion of phase V, obtain physical measurements of the weapons.

2.4.4 Results

Visual inspection and physical measurements after test indicate that the chamber condition of the four weapons was relatively unchanged from that observed in the static dust test. Table 2.4-I gives the head space and firing pin protrusion measurements. Weapon function performance is given in Table 2.4-II and average cyclic rates in Table 2.4-III. Fired case photographs are shown in Figures 2.4-1 and 2.4-2. Bore and chamber measurements are contained in Appendix I.

Table 2.4-I. Head Space and Firing Pin Protrusion after Test

Chrome-Plated Chamber	APG Weapon No.	HSP Go-Gage Length, in.	FPP, in.	Dimensional Change From Initial Insp
Yes	1	1.4656	0.032	None
Yes	2	1.4666	0.032	None
No	6	1.4656	0.032	None
No	7	1.4666	0.034	None

HSP = Head space.
FPP = Firing pin protrusion.

Prior to firing in the different dust-type environments, each clean weapon was fired 140 rounds for cyclic rate. Only two malfunctions occurred: One FS1 (failure to strip first round of magazine) in weapon No. 2 and one Stub-1 (stub of first round of magazine) in weapon No. 6.

Stub-1 malfunctions which occurred during firing in the dust environments were caused by permanent deformation of the right feed lip which allowed the top cartridge to be incorrectly positioned for feeding. The feed lip deformation was gradually induced by repeated use of the magazines.

Table 2.4-II. Dynamic Dust Test Function Data, Totals for Three Trials

		Malfunctions, by Type											
		Type I						Type II					
APG Wpn No.[a]	Rds Fired	STUB-1	FS1	FS	FC	Total	Malfunct per 100 Rds	BOB-DR	DF	FX	FJ	Total	Malfunct per 100 Rds
Silica Flour Dust													
1	420	0	21	0	2	23	5.5	0	0	0	0	0	0
2	420	0	21	0	0	21	5.0	0	0	0	0	0	0
6	420	0	21	0	0	21	5.0	0	0	0	0	0	0
7	382	0	20	0	2	22	5.8	0	0	1	0	1	.26
Low Grade Iron Ore Type Soil, Pleiku Area													
1	420	0	0	0	0	0	0	0	0	0	0	0	0
2	420	0	0	0	0	0	0	0	0	0	0	0	0
6	420	0	0	0	0	0	0	0	0	0	0	0	0
7	360	0	0	0	1	1	.27	0	0	0	0	0	0
Whitish-Grey Dust, Lai-Khe Area													
1	420	0	0	0	0	0	0	0	0	0	0	0	0
2	420	0	0	0	0	0	0	0	0	0	0	0	0
6	420	1	1	0	1	3	.71	0	0	0	0	0	0
7	420	3	1	0	0	4	.95	0	0	0	0	0	0
Dust Type Sand, Cam Ranh-Bay Area													
1	420	1	0	0	0	1	0.24	0	0	0	0	0	0
2	420	0	2	0	0	2	.48	0	0	0	0	0	0
6	420	1	0	0	0	1	.24	0	0	0	0	0	0
7	420	0	0	0	0	0	0	0	0	0	0	0	0

[a]Rifle Nos. 1 and 2 with plated chambers, Nos. 6 and 7 with nonplated chambers.

Table 2.4-II (Cont'd)

APG Wpn No.[a]	Rds Fired	Malfunctions, by Type: Type I STUB-1	FS1	FS	FC	Total	Malfunct per 100 Rds	Type II BOB-DR	DF	FX	FJ	Total	Malfunct per 100 Rds
Silica Flour Dust (One Trial)													
1	140	0	3	0	1	4	2.9	0	0	0	0	0	0
2	140	0	2	0	0	2	1.4	0	0	0	0	0	0
6	21	1	0	0	0	1	4.8	0	0	1	0	1	4.8
7	140	0	7	0	0	7	5.0	0	0	0	0	0	0

[a]Rifle Nos. 1 and 2 with plated chambers, Nos. 6 and 7 with nonplated chambers.

Table 2.4-III. Cyclic Rates Recorded Before and During Dynamic Testing[a]

Prior to Dust Environment, APG Weapon No. 1	2	6	7	Dust Types	Dust Environment, APG Weapon No. 1	2	6	7
828	908	894	886	Silica flour	775	846	802	800
857	889	858	887	Pleiku[b]	841	882	880	889
899	907	906	914	Lai-Khe[b]	859	885	855	871
867	872	855	866	Cam Ranh-Bay[b]	840	874	875	879
902	907	863	895	Silica flour[c]	702	786	773	776

[a]The cyclic rate figures are averages for seven 20-round bursts for the predust environment and twenty-one 20-round bursts for the dust environment, except where nonclearable stoppages occurred.
[b]Dust samples from specific areas in Viet Nam.
[c]Average of seven 20-round bursts.

2.4.5 Analysis

Chrome-plated chambers improved the function performance of the weapon by eliminating the failures to extract which were the cause of type II malfunctions in nonplated chamber weapons (ref Table 2.4-II and Figures 2.4-1 and 2.4-2).

The standard 140-mesh silica flour used in all dust tests of small arms weapons at Aberdeen Proving Ground produces test conditions, the severity of which equal or surpass those of the other dust types evaluated.

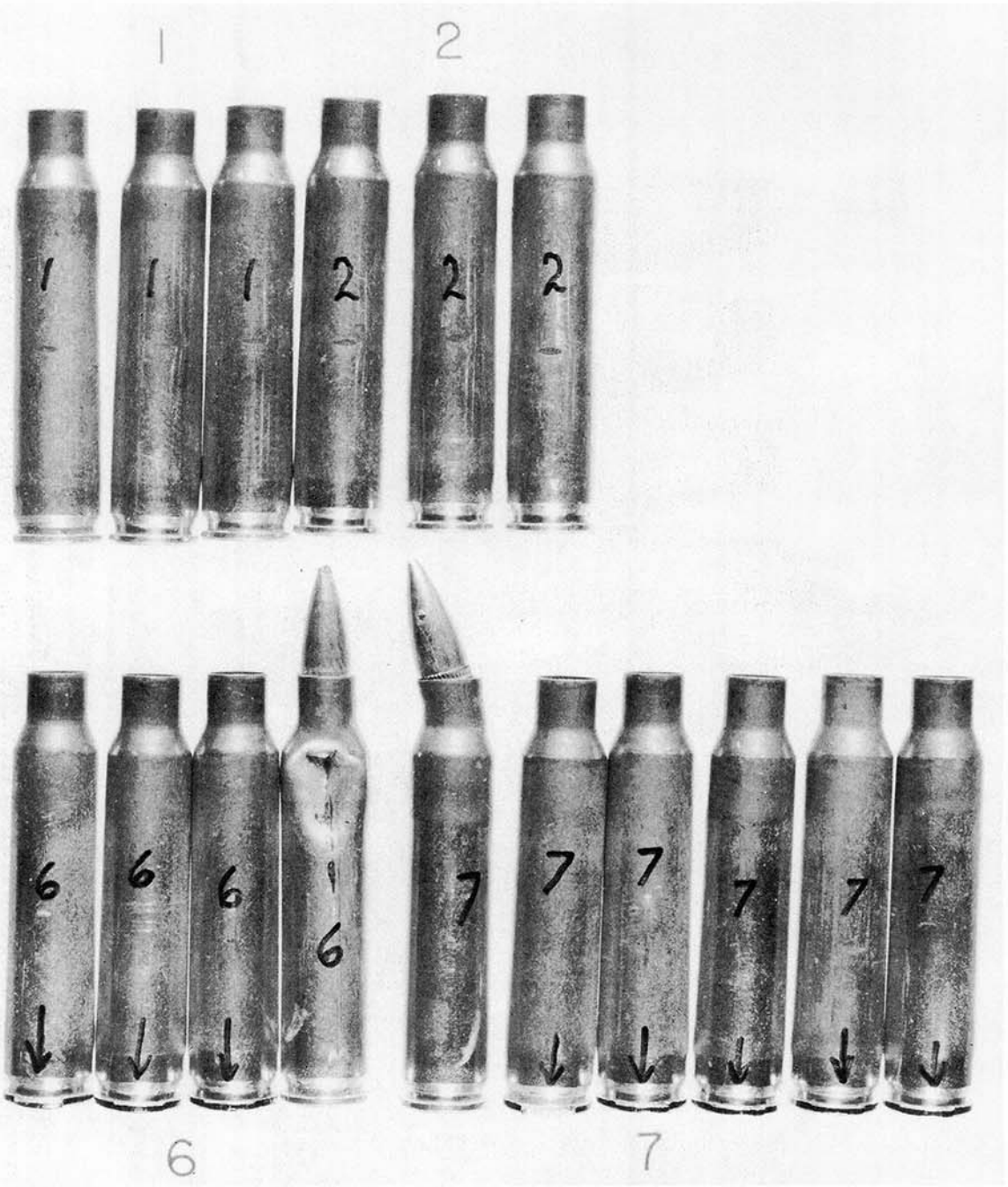

Figure 2.4-1: Dynamic Dust Test. Examples of Case Rim Deformation Observed during the 3-Trial Silica Flour Phase I (Numbers Correspond to Weapons). Note Absence of Deformation on Nos. 1 and 2. Deformed Cartridges Are Result of Feeding Malfunctions.

Figure 2.4-2: Dynamic Dust Test. Examples of Case Rim Deformation Observed during Single-Trial Silica Flour Phase V (Numbers Correspond to Weapons). Note Absence of Deformation on Nos. 1 and 2. Deformed Cartridge Is Result of Feeding Malfunction.

2.5 SALT WATER IMMERSION, HIGH TEMPERATURE - HUMIDITY TEST

2.5.1 Objective

To determine if chrome-plating the M16A1 rifle chamber improves weapon performance by decreasing or eliminating the tendency of the chamber to rust which, in turn, causes failures to extract fired cartridge cases.

2.5.2 Criteria

The chrome-plating must prevent rust from deteriorating the chamber area by surface pitting.

2.5.3 Method

Use the four weapons previously evaluated in the static and dynamic dust tests and 20 new magazines. Immerse the fully-loaded magazines for 60 seconds in a mixture of 20% sodium chloride (in solution) and 80% water. Remove the magazines and test fire five in each weapon. Reload the magazines and repeat the immersion conditioning and store all ammunition and the upper receiver assemblies of the weapons in an environmental chamber. Store a loaded cartridge in one plated and one nonplated chamber. Inspect and test-fire 20 rounds from each weapon on the third, sixth, and tenth days of the test cycle. Record cyclic rate if obtainable. Inspect all fired cartridge cases. Control environmental chamber temperature at 105°F and 90 to 95% relative humidity. Test-fire the weapons at room temperature (+70 to +80°F). Conduct firing in the automatic mode only.

2.5.4 Results

The results of this subtest, indicate that chrome-plating the M16A1 rifle chamber does retard the propagation of rust pits compared to results obtained with nonplated chambers; however, as presently applied, the plating does not entirely eliminate pitting, especially if a cartridge is stored in the chamber. Photographs of the plated and nonplated chambers, and fired cases taken after the 10-day test, are given in Figures 2.5-1 through 2.5-13. Head space and firing pin protrusion measurements taken after completion of this test are given in Table 2.5-I. Function data are given in Tables 2.5-II through 2.5-VI. The large increase in head space exhibited by the nonplated-chamber rifles (Nos. 6 and 7) is the result of rust deterioration of the chamber head spacing shoulder.

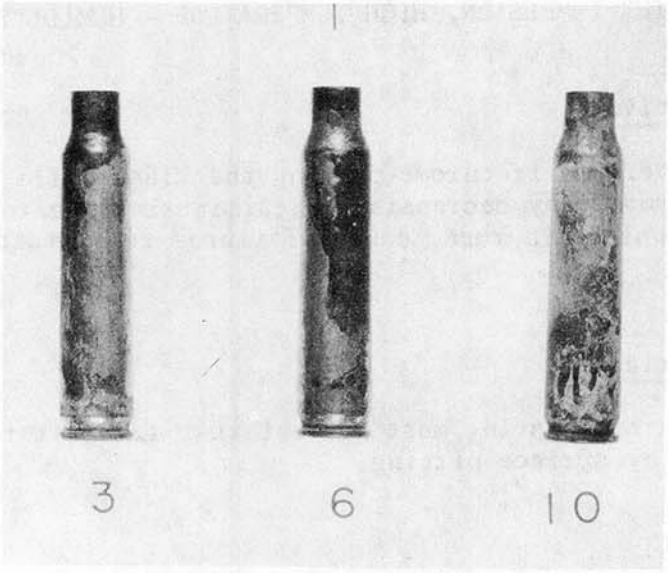

Figure 2.5-1: Salt-Water-Contaminated Cases. Cases Stored In Chrome-Plated-Chamber Weapon No. 1 for 2, 3, and 4 Days. Firing Conducted on Thrid, Sixth, and Tenth Days.

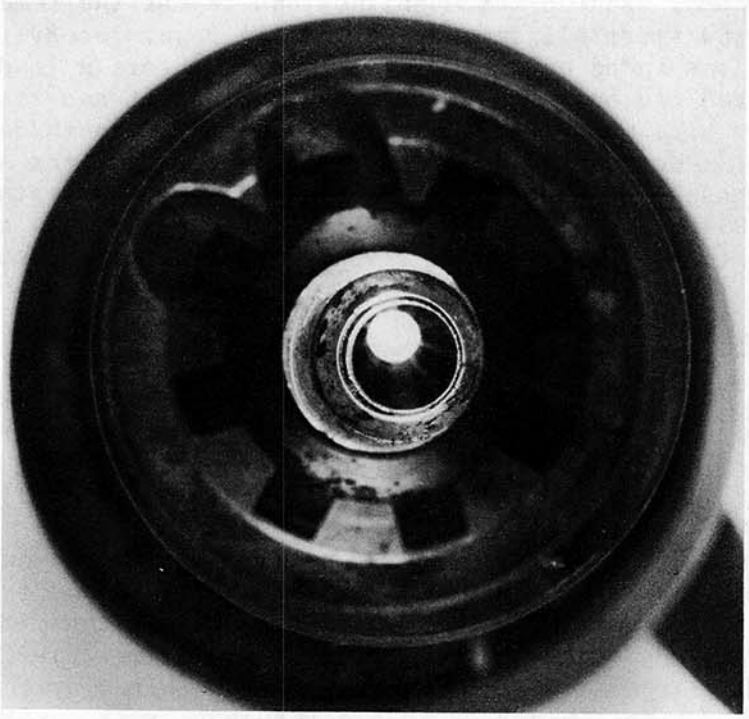

Figure 2.5-2: Chrome-Plated Chamber, Weapon No. 1 after 10 Days with Loaded Cartridges Chambered during Storage Showing Chamber Shoulder.

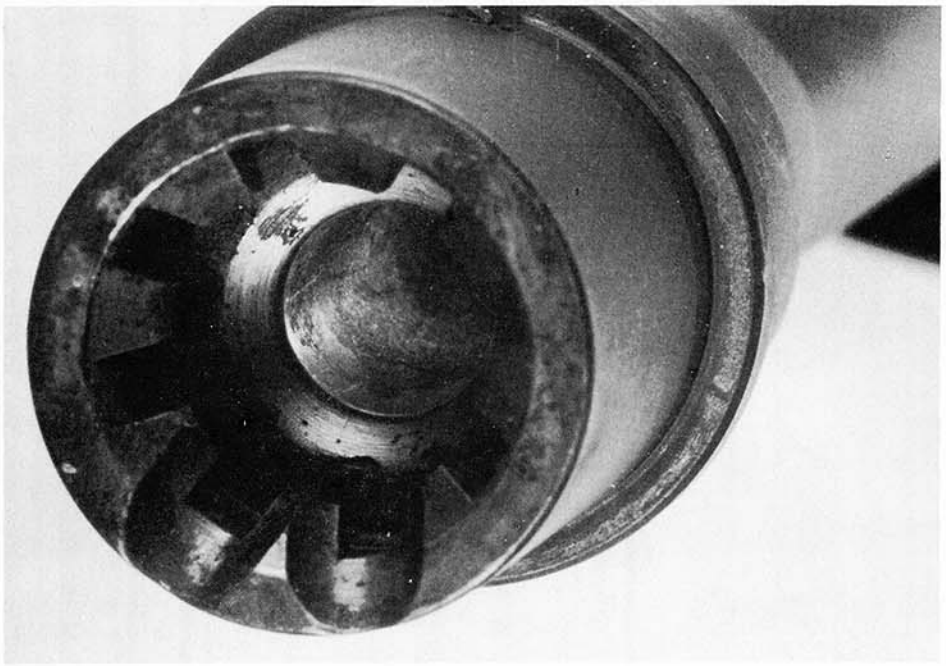

Figure 2.5-3: Chrome-Plated Chamber, Weapon No. 1 after 10 Days with Loaded Cartridges Chambered during Storage Showing Removal of Plating and Light Pitting of Lower Portion of Chamber.

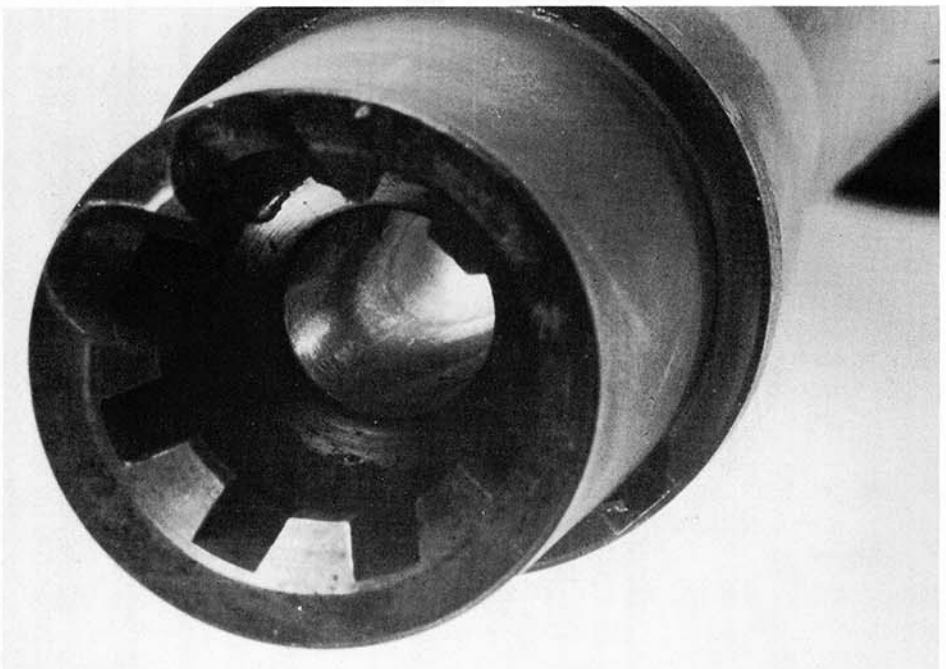

Figure 2.5-4: Chrome-Plated Chamber, Weapon No. 1 after 10 Days with Loaded Cartridges Chambered during Storage Showing Right Side of Chamber with Plating Unaffected by Salt Water.

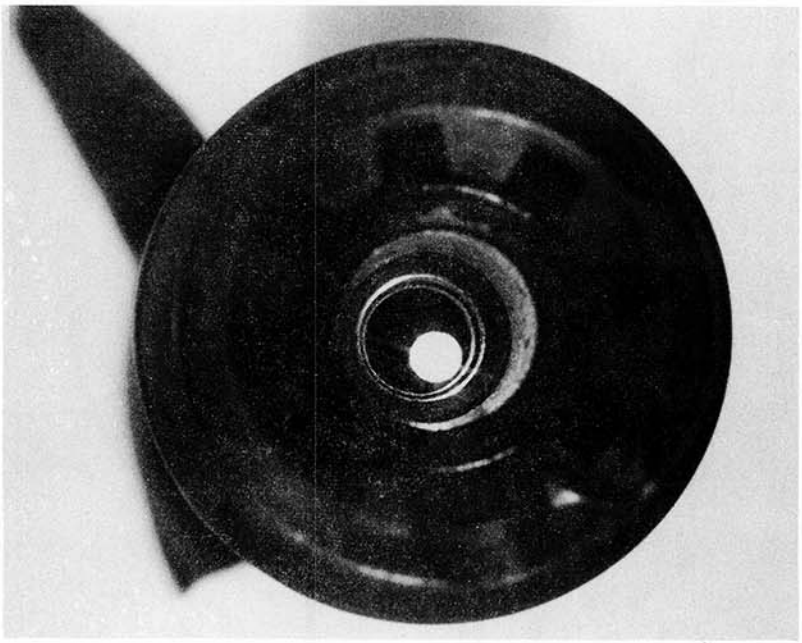

Figure 2.5-5: Chrome-Plated Chamber, Weapon No. 2 after 10 Days without Cartridge Stored in Chamber during Nonfiring Periods. View Showing Spot-Pitting of Chamber Shoulder.

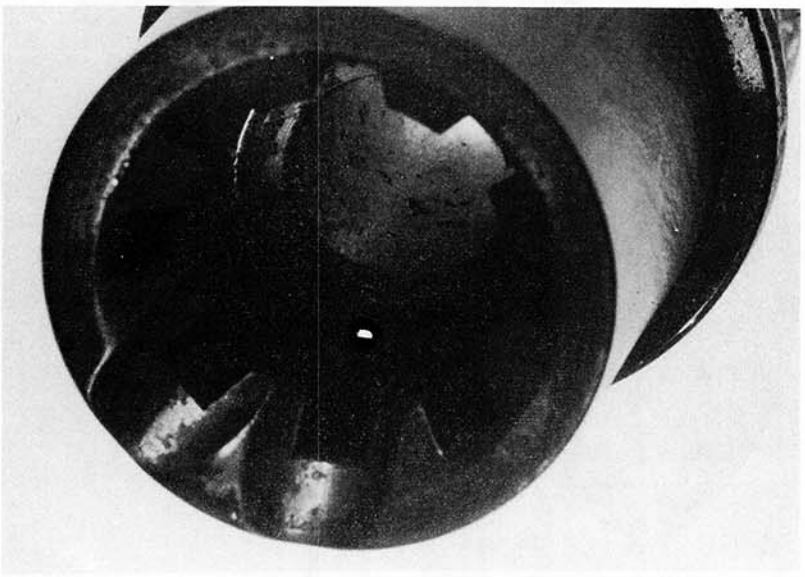

Figure 2.5-6: Chrome-Plated Chamber, Weapon No. 2 after 10 Days Showing Spot-Pitting in Chamber Body.

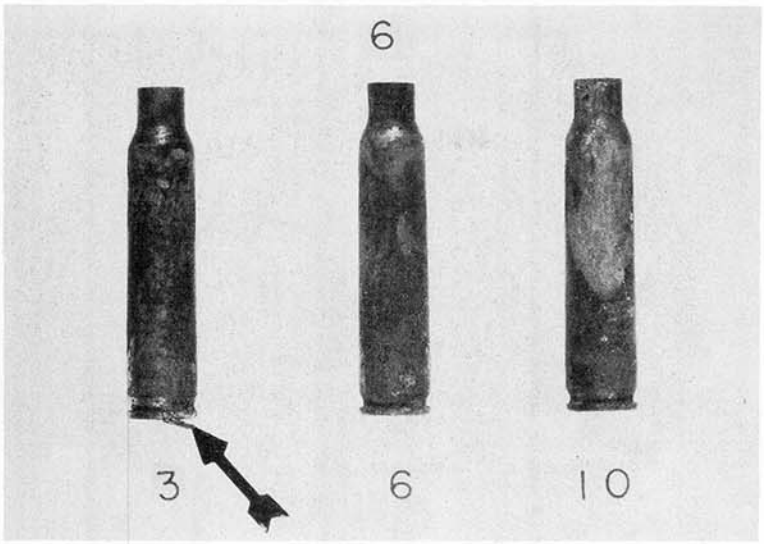

Figure 2.5-7: Salt-Water-Contaminated Cases after Storage in Nonplated Chamber, Weapon No. 6, for 2, 3, and 4 Days. Firing Conducted on Third, Sixth, and Tenth Days. Rim Shears Occurred after 2 Days' Storage, Firing on Third Day. As Shown, Cases Stored 3 Days and 4 Days Did Not Undergo Rim Shears.

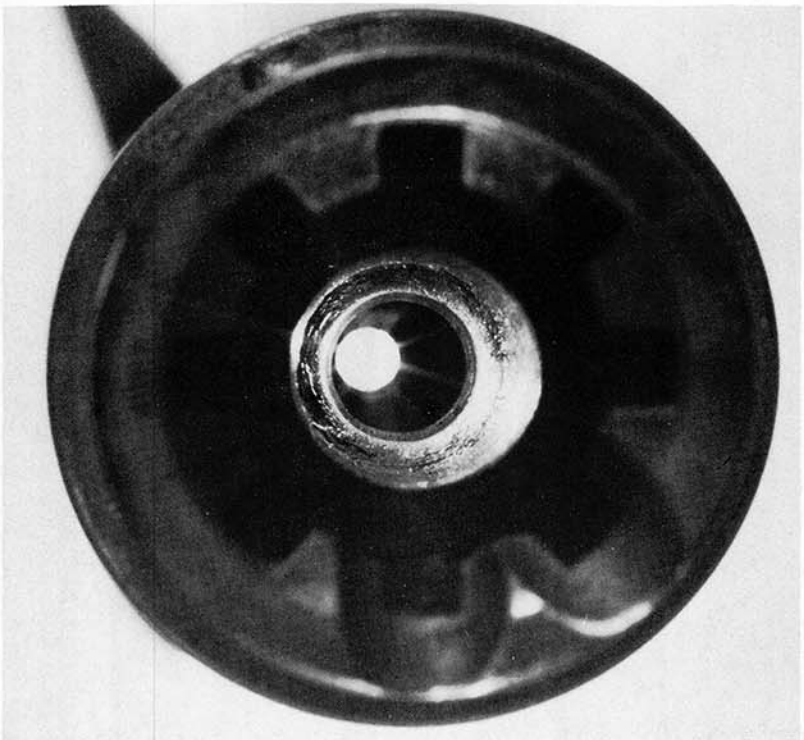

Figure 2.5-8: Nonplated Chamber, Weapon No. 6, after 10 Days Showing Deterioration of Chamber Shoulder.

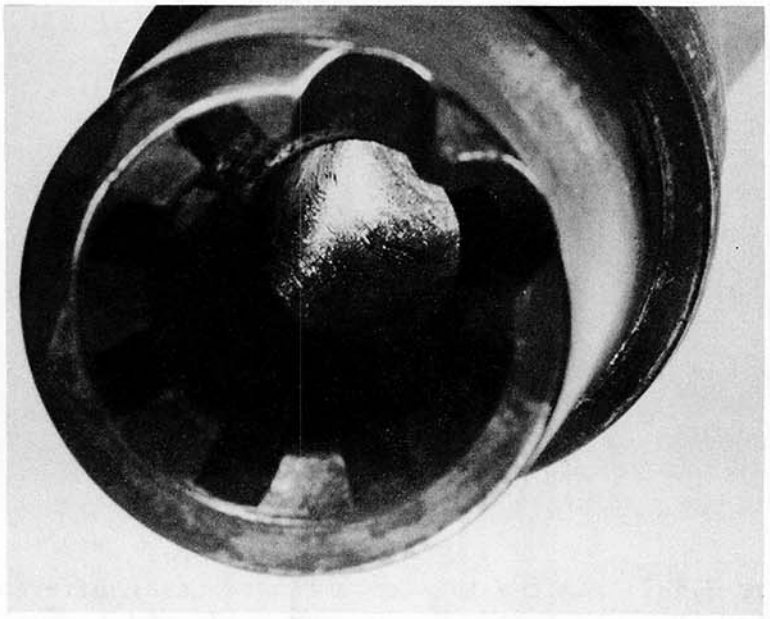

Figure 2.5-9: Nonplated Chamber, Weapon No. 6, after 10 Days Showing Chamber Pitting.

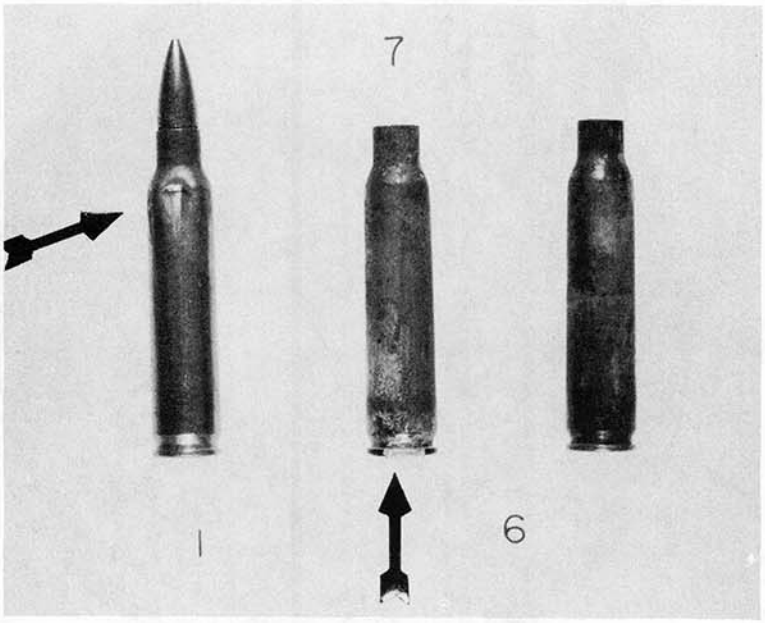

Figure 2.5-10: Salt-Water-Contaminated Cases Fired on Nonplated Chamber, Weapon No. 7. LEFT: Double-Fired Case Deformation on First Day. CENTER: Rim Shear (Arrow) Occurring on First Round Fired on 6th Day. RIGHT: Second Round Fired, Showing No Indication of Rim Shear.

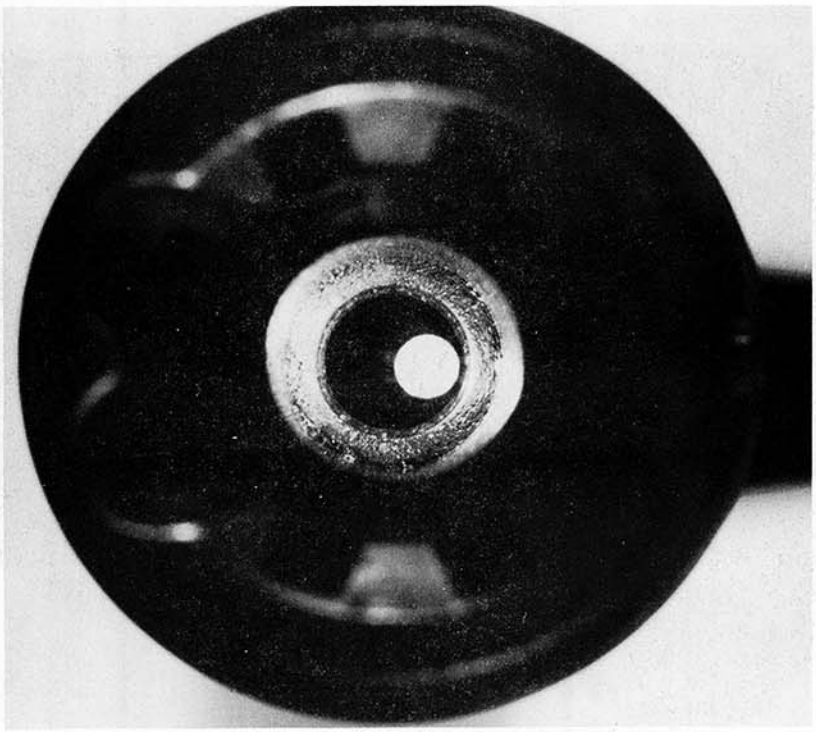

Figure 2.5-11: Nonplated Chamber, Weapon No. 7, after 10 Days without Chambered Cartridges during Storage Showing Extreme Deterioration of Head-Spacing Shoulder which Caused 0.003-Inch Head Space Increase.

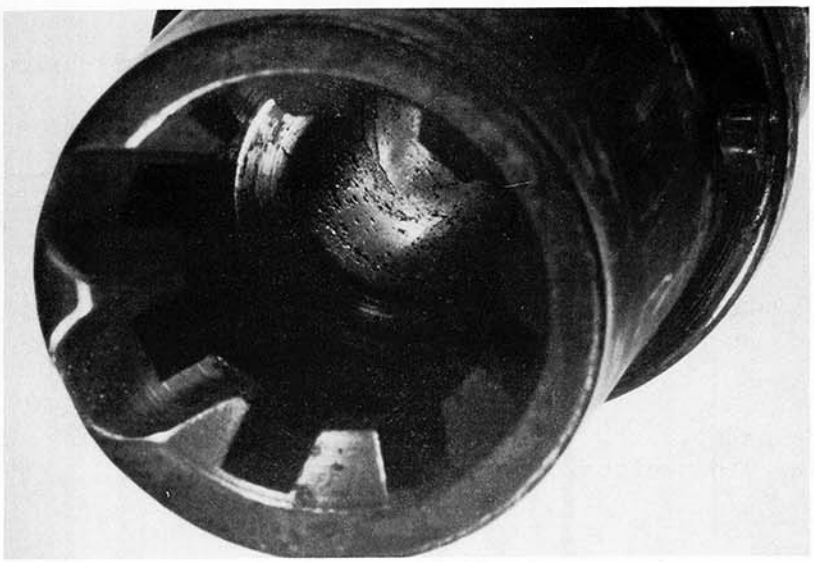

Figure 2.5-12: Nonplated Chamber, Weapon No. 7, after 10 Days Showing Severe Pitting of Chamber Body.

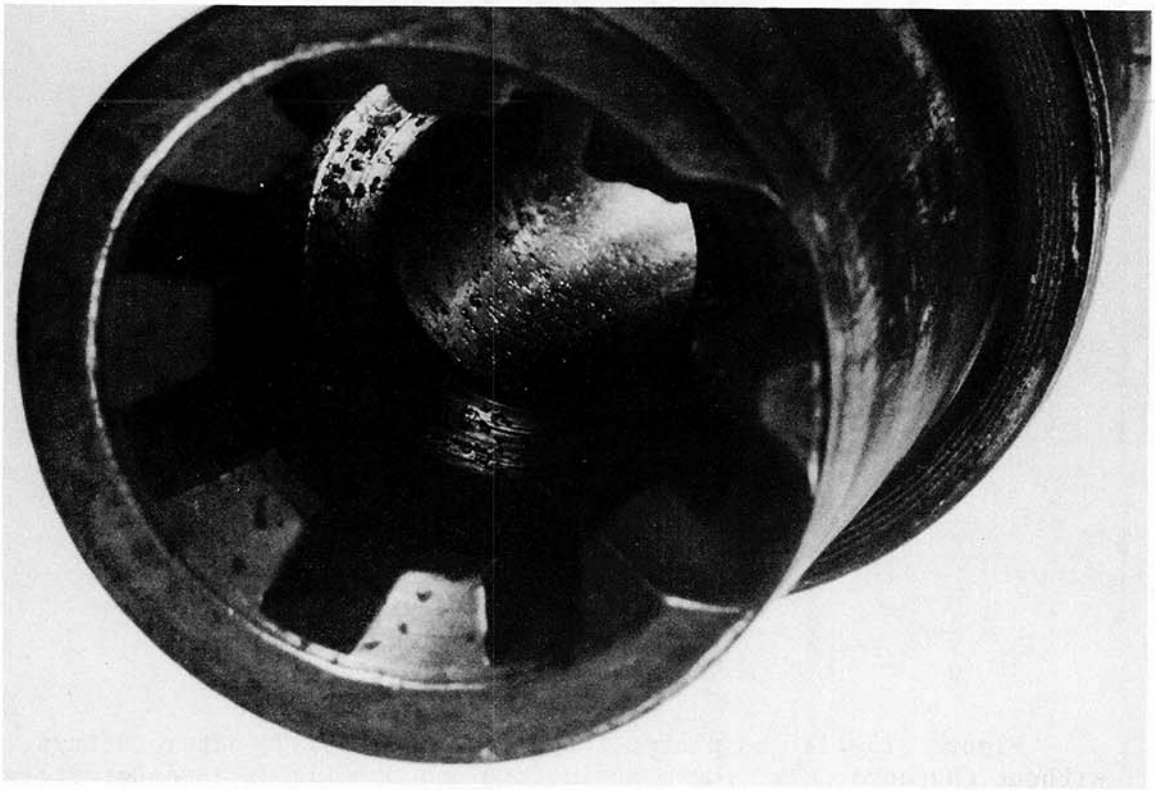

Figure 2.5-13: Nonplated Chamber, Weapon No. 7, after 10 Days. View Is Similar to Figure 2.5-9 but with Barrel Rotated 180°.

Table 2.5-I. Head Space and Firing Pin Protrusion

APG Weapon No.	Chrome-Plated Chamber	HSP Go-Gage Length, in.	FPP, in.	Dimensional Change From Initial Insp, in.	
				HSP	FPP
1	Yes	1.4666	0.031	+0.001	-0.001
2	Yes	1.4676	.035	+0.001	+0.003
6	No	1.4696	.035	+0.004	+0.003
7	No	1.4696	.033	+0.003	-0.001

HSP = Head space.
FPP = Firing pin protrusion.

Table 2.5-II. Saltwater Immersion, Temperature - Humidity Test Data - Weapon No. 1

Magazine No.	Mode of Fire	No. Rds Fired	Function Performance and Remarks
			First Day
37 to 41	A	100	Fired in five 20-round bursts, satisfactorily. Chambered loaded cartridge for storage test.
			Third Day
	S	1	Fired chambered round satisfactorily.
37	A	20	Rounds 1 and 2, FS. Used bolt closure assist. Round 12, FC. Used bolt closure assist. The bolt and carrier assemblies rusted wherever the phosphate coating had been worn off. Chambered loaded cartridge for storage test.
			Sixth Day
	S	1	Fired chambered round satisfactorily.
38	A	20	Rounds 1 and 2, FC. Round 3, FFR with light primer indent. Fouled ammunition contaminated the chamber with corrosion residue from reaction with salt. Rounds 4, 6, and 8, FC. Cyclic rate for last 13 rounds chambered loaded cartridge for storage test.
			Tenth Day
	S	1	Fired chambered round satisfactorily. Fired case ejected, but due to rusting and corrosion of weapon components, the bolt did not complete the rearward cycle (short recoil).
39	A	20	Rounds 1, 7, 11, and 12, FC. Cyclic rate for last 8 rounds.
40	A	20	Liberal application of MIL-L-46000A to the bolt and carrier assemblies, and top cartridges in the magazine (without any disassembly of the weapon) was performed. Weapon functioned satisfactorily.

Table 2.5-III. Saltwater Immersion, Temperature - Humidity Test Data, Weapon No. 2

Magazine No.	Mode of Fire	No. Rds Fired	Function Performance and Remarks
			First Day
42 to 46	A	100	Fired five 20-round bursts satisfactorily.
			Third Day
42	A	20	Visual inspection of chamber prior to firing indicated rust spots of pinhead size throughout chamber area. Round 2, COEC.
			Sixth Day
43	A	20	Same chamber rusting noted after 6 days. Rounds 2 and 17, FC. Used bolt closure-assist device to try to chamber the cartridges. Had to impact the device on end of shooting bench to completely lock weapon. Corrosion was severe on cases, preventing satisfactory chambering. Weapon rusting (bolt and carrier assemblies) and corrosion of the aluminum extensive.
			Tenth Day
44	A	20	Chamber rust spots appeared to have increased in number since the sixth day of storage. Rounds 4, 12, and 18, FC.
45	A	20	The same application of lubricant as described for weapon No. 1 provided satisfactory functioning.

Table 2.5-IV. Saltwater Immersion, Temperature - Humidity Test Data, Weapon No. 6

Magazine No.	Mode of Fire	No. Rds Fired	Function Performance and Remarks
			First Day
47 to 51	A	100	Fired five 20-round bursts satisfactorily Chambered loaded cartridge for storage test.
			Third Day
	S	1	Chambered round FX (rim shear) used cleaning rod to remove case.
47	A	20	As in weapons 1 and 2, the bolt and carrier rusted; 20 rounds fired satisfactorily. Chambered loaded cartridge for storage test.
			Sixth Day
	S	1	Case ejected, but short recoil prevented feeding of top round from magazine.
48	A	20	Rounds 2 and 3, COEC. Rounds 9, 11, 15, and 18, FC. Chambered loaded cartridge for storage test.
			Tenth Day
	S	1	Case ejected but short recoil prevented feeding of top round from magazine.
49	A	20	Rounds 1, 4, 8, 9, 10, and 19, FC. Round 16, BOB-DR.
50	A	20	Application of lubricant as described for weapon No. 1 provided satisfactory functioning.

Table 2.5-V. Saltwater Immersion, Temperature - Humidity Test Data, Weapon No. 7

Magazine No.	Mode of Fire	No. Rds Fired	Function Performance and Remarks
			First Day
52 to 56	A	100	Magazine No. 53, rounds 17 and 18 were double-fed.
			Third Day
52	A	20	Chamber completely rusty. Three attempts were made to chamber the first cartridge before success. To retract the bolt in preparation for firing, the buttstock of the weapon had to be impacted with considerable force onto the shooting bench while the charging handle was pulled rearward.
			Sixth Day
53	A	20	Same remarks about chamber and components rusting as on third day. First round fired was FX (rim shear) cleaning rod was used to remove case. Bolt did not unlock, but in attempt to extract case by impacting butt of rifle on the table, the case rim was sheared. Rounds 2, 3, 11, 16, 17, 18, and 20, FC. Round 19, BOB.
			Tenth Day
54	A	20	Weapon inoperative due to rust and corrosion. Mechanism was field-disassembled, rinsed with water, and reassembled. Abrasion of the upper receiver, by the previous dust testing caused galling of the part and prevented manual retraction of the bolt without application of MIL-L-46000A lubricant. After the lubricant was applied, the weapon fired satisfactorily.

Table 2.5-VI. Cyclic Rate of Weapons Used in Salt Water Immersion, High Temperature - Humidity Test

Magazine Sequence	Cyclic Rate per Weapon, rd/min			
	Plated-Chamber Rifles		Nonplated Chamber Rifles	
	1	2	6	7
	First Day			
First	796	857	808	834
Second	808	863	832	847
Third	811	867	859	849
Fourth	829	887	867	873
Fifth	832	891	832	883
Average	815	873	840	857

Note: Complete 20-round cyclic rates were not obtainable for remainder of test; however, fragmentary rates obtained are given in Table 1.4-II.

2.5.5 Analysis

Other factors such as bolt and bolt-carrier rusting and upper receiver corrosion caused the reduction in function performance experienced with the chrome-plated-chamber weapons. Since the plated chambers were not as severely deteriorated by rust as were the nonplated chambers after 10 days without maintenance, a definite improvement has been demonstrated.

Further development of the plating processes is required to reduce the tendency to spot-pitting encountered with chrome-plating (chamber) as presently applied.

2.6 FUNCTION AND DURABILITY TEST

2.6.1 Objective

To determine the durability of chrome-plated chambers and their effect on weapon performance during the firing of 10,000 rounds per weapon.

2.6.2 Criteria

Chrome-plating the chamber in M16A1 rifles must not cause degradation of weapon performance. The firing of 10,000 rounds must not render the plating unserviceable.

2.6.3 Method

Test-fire each weapon a total of 10,000 rounds in 100-round cycles. Cool the weapons after each cycle. Clean, visually inspect, and relubricate (MIL-L-46000A) at intervals of 1000 rounds (ten cycles). Obtain chamber measurements at 6, 8, and 10 thousand rounds and bore dimensions at 6 and 10 thousand rounds. Alternate the mode of fire each 100 rounds within every 1000-round interval from 20-round automatic bursts to semiautomatic and 3- to 5-round automatic bursts. Record cyclic rate for all 20-round burst firing. Inspect all fired cases. Obtain 50-meter witness screen targets for the last 100 rounds fired from each weapon at 6-, 8-, and 10-thousand-round intervals.

2.6.4 Results

Table 2.6-I gives the head space and firing pin protrusion measurements. Tables 2.6-II through 2.6-VII give the cyclic rate and function performance data. Figure 2.6-1 shows the difference in configuration of the gas tube of weapon 3 and that of a normal tube. Absence of the gas check "button" on the end of the gas tube did not cause a degradation of weapon performance. The total number of malfunctions occurring in weapon No. 3 was less than that for either of the other two weapons used.

The witness screen firings indicated that no projectile yaw occurred although severe metal fouling was present in the bore (ref Appendix I, bore measurements).

All cartridge case casualties and damaged rounds encountered in 30,000 rounds of firing are shown in Figures 2.6-2 through 2.6-4.

Table 2.6-I. Head Space and Firing Pin Protrusion Measurements of Function and Durability Test Weapons

APG Wpn No.	Chrome-Plated Chamber	After 6000 Rds Each HSP Go-Gage Length	After 6000 Rds Each FPP	Dimensional Change from Initial Insp HSP	Dimensional Change from Initial Insp FPP	After 8000 Rds Each HSP Go-Gage Length	After 8000 Rds Each FPP	Dimensional Change from 6000-Rd Insp HSP	Dimensional Change from 6000-Rd Insp FPP	After 10,000 Rds Each HSP Go-Gage Length	After 10,000 Rds Each FPP	Dimensional Change from 8000-Rd Insp HSP	Dimensional Change from 8000-Rd Insp FPP
3	Yes	1.4676	0.034	+0.002	0.000	1.4676	0.034	0.000	0.000	1.4676	0.033	0.000	-0.001
4	Yes	1.4666	.034	+0.001	+0.001	1.4666	.034	.000	.000	1.4676	.035	+ .001	+ .001
5	Yes	1.4666	.031	0.000	0.000	1.4676	.031	+ .001	.000	1.4676	.032	.000	+ .001

HSP = Head space.
FPP = Firing pin protrusion.

Note: Measurements are in inches.

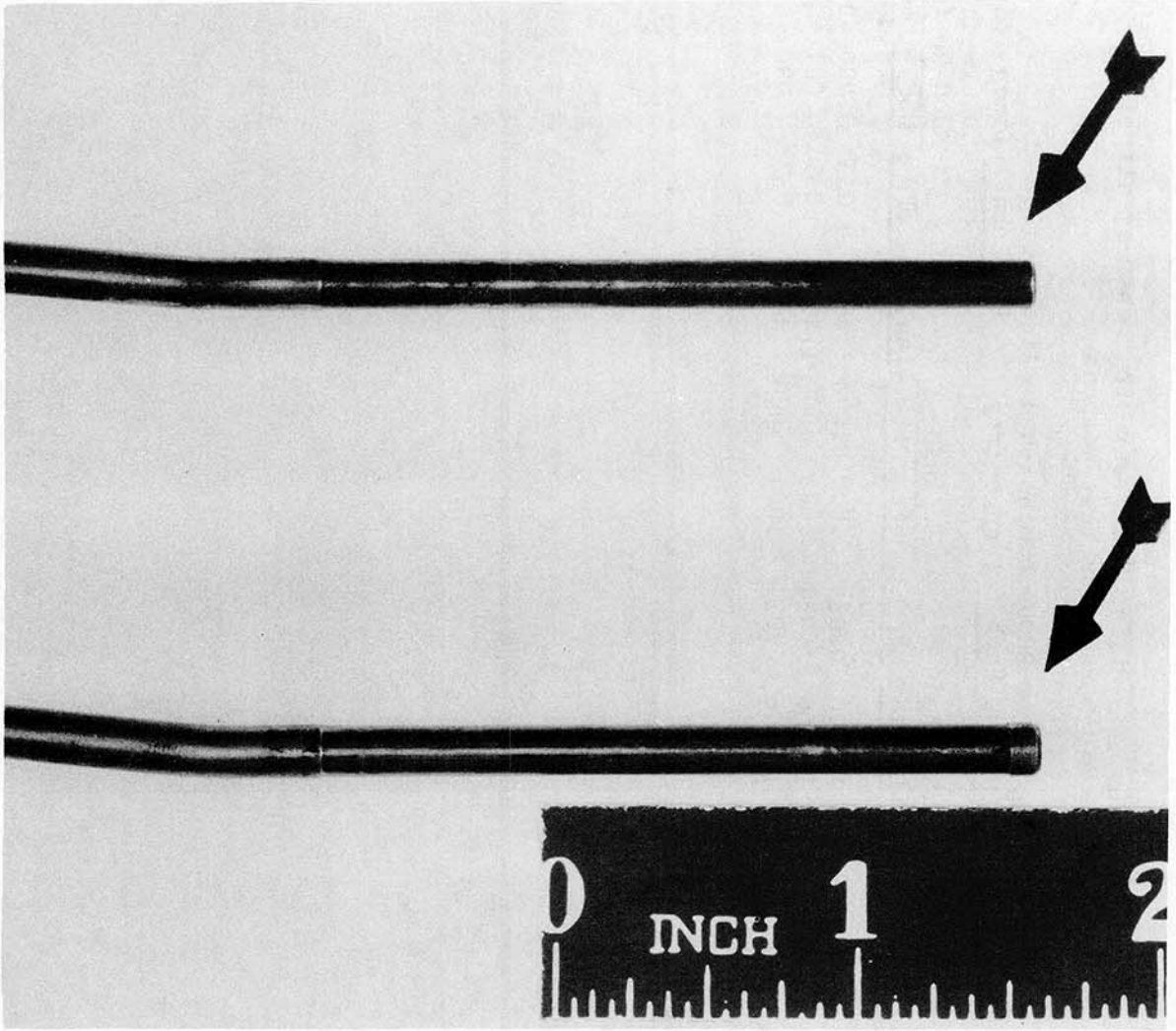

Figure 2.6-1: Gas Tube from Weapon No. 3 (TOP) Showing 0.013-Inch-Diameter Reduction due to Absence of "Button" on End of Tube. BOTTOM: Normal Gas Tube.

2.6.5 Analysis

Each of the weapons fired in this test showed a general pattern of increased malfunctions between approximately 5000 and 8000 rounds. Concurrently, the average cyclic rate for successive 1000-round increments of firing decreased to a low point at about 7000 rounds and increased thereafter for the duration of the test. The malfunction and cyclic rate performance of each weapon is presented graphically with further pertinent analysis in Appendix I.

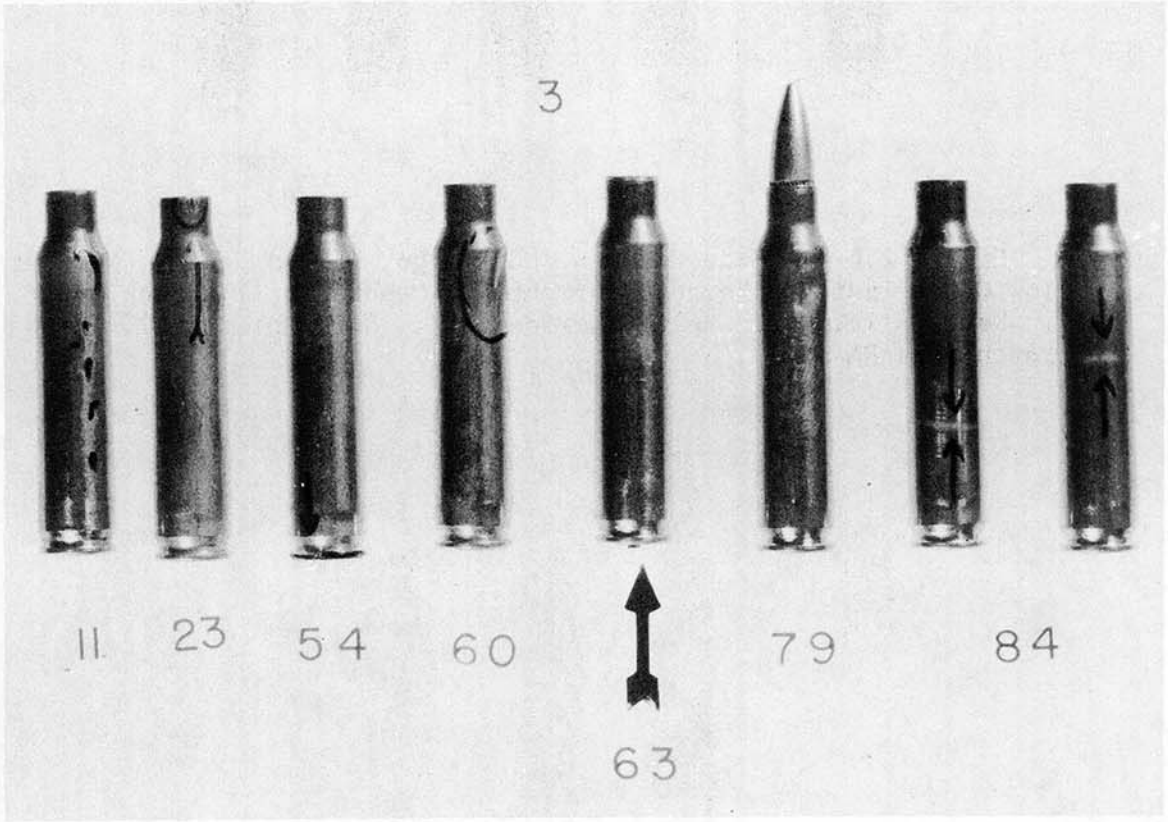

Figure 2.6-2: Case Defects and Damage, Weapon No. 3. Numbers below Cases Indicate Round Occurrence in Hundreds. 11. Case Dents. 23. Neck Split. 54. Partial Rim Shear. 60. Case Dents. 63. Pierced Primer. 79. Case Dents. 84. Two Case Stretches (Lot RA-5273).

Note: Case Dents Evident prior to Testing.

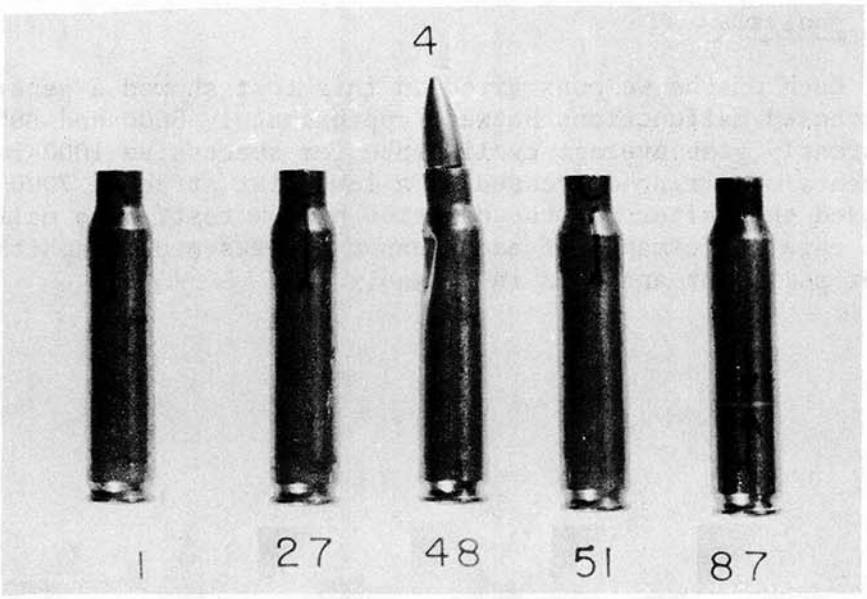

Figure 2.6-3: Case Defects and Damage, Weapon No. 4. Numbers below Cases Indicate Round Occurrence in Hundreds. 1. Neck Split. 27. Neck Split. 48. Bolt Override. 51. Neck Split. 87. Case Stretch (Lot RA-5273).

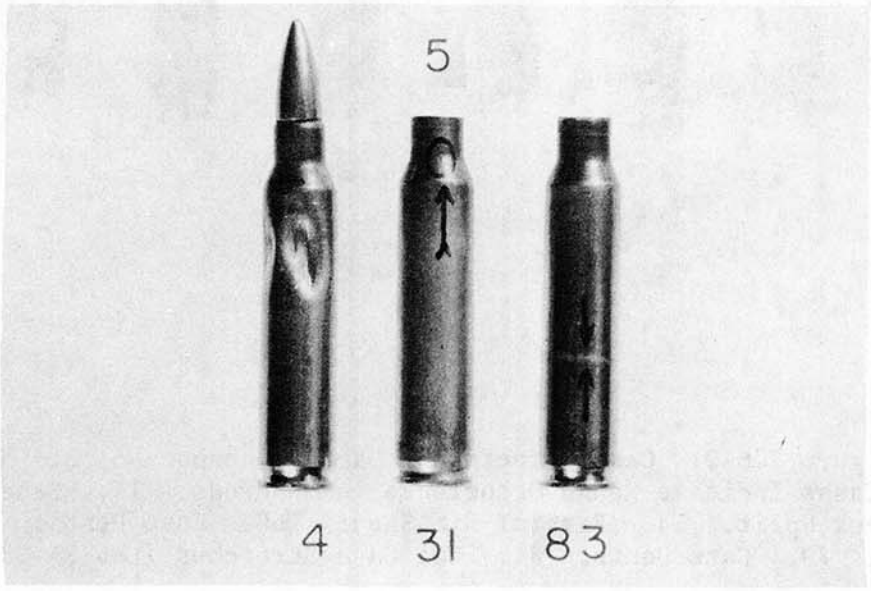

Figure 2.6-4: Case Defects and Damage, Weapon No. 5. Numbers below Cases Indicate Round Occurrence in Hundreds. 4. Bolt Override. 31. Neck Split. 83. Case Stretch (Lot RA-5273).

Table 2.6-II. Round-by-Round Function and Durability Test Data, Weapon No. 3

Magazine No.	100-Rd Trial No., Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
Cycle No. 1																				
22																				
23																				
24	None in This Cycle																			
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 2																				
22																				
23																				
24	None in This Cycle																			
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 3																				
22																				
23																				
24	None in This Cycle																			
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 4																				
22																				
23																				
24	None in This Cycle																			
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 5																				
22																			1-FS	2
23																	1-FS	2		
24																				
25															1-FBR	20				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-	1	-

Table 2.6-II (Cont'd)

Magazine No.	100-Rd Trial No., Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
										Cycle No. 6										
22																	1-COEC	2		
23											1-FS	2			1-FS	2	1-FS	3	1-COEC	2
24																				
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	1	-	0	-	1	-	2	-	1	-
										Cycle No. 7										
22																	1-FS	2		
23																				
24																				
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-
										Cycle No. 8										
22																			1-BOB-DR	3
23																			1-FBR	20
24																				
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	2	-
										Cycle No. 9										
22																				
23																	1-FBR	20		
24																				
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-
										Cycle No. 10										
22																				
23																				
24										None in This Cycle										
25																				
26																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Note: All cycles consisted of 1000 rounds.

Table 2.6-III. Function and Durability Test Data, Cyclic Rate of Weapon No. 3, Recorded During 20-Round Automatic Burst Firings

Magazine No.	Rate Recording Interval, rds				Avg
	1 to 100	301 to 400	601 to 700	901 to 1000	
			Cycle No. 1		
22	808	808	791	791	800
23	831	847	829	832	835
24	871	883	851	861	866
25	899	900	875	871	886
26	937	926	904	908	919
Avg	868.8	872.8	850.0	852.6	861
			Cycle No. 2		
22	820	759	711	695	746
23	825	802	752	738	779
24	832	838	762	747	795
25	859	851	798	775	821
26	863	877	815	789	836
Avg	839.8	825.4	767.6	748.8	795
			Cycle No. 3		
22	775	733	723	689	730
23	815	765	767	759	776
24	844	801	813	798	814
25	859	829	847	815	838
26	887	859	871	853	868
Avg	836.0	797.4	804.2	782.8	805
			Cycle No. 4		
22	825	738	711	716	748
23	869	791	753	758	793
24	897	802	791	775	816
25	919	816	802	788	831
26	912	855	829	808	851
Avg	884.4	800.4	777.2	769.0	808

Table 2.6-III (Cont'd)

Magazine No.	Rate Recording Interval, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
			Cycle No. 5		
22	756	708	683	-	716
23	791	765	729	693	744
24	844	802	759	719	781
25	877	836	792	740	811
26	883	851	829	756	830
Avg	830.2	792.4	758.4	727.0	777
			Cycle No. 6		
22	746	680	622	627	669
23	791	716	706	682	724
24	808	737	729	714	747
25	823	759	747	716	761
26	829	791	775	731	782
Avg	799.4	736.6	715.8	694.0	736
			Cycle No. 7		
22	639	590	548	584	590
23	714	674	627	632	662
24	762	693	672	678	701
25	781	711	690	690	718
26	801	738	719	714	743
Avg	739.4	681.2	651.2	659.6	683
			Cycle No. 8		
22	650	579	607	639	619
23	703	627	667	672	667
24	715	680	690	708	698
25	726	698	707	710	710
26	729	714	714	727	721
Avg	704.6	659.6	677.0	691.2	683

Table 2.6-III (Cont'd)

Magazine No.	Rate Recording Intervals, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
			Cycle No. 9		
22	734	670	670	673	687
23	781	724	715	726	736
24	804	752	740	758	764
25	816	765	755	770	776
26	832	775	768	784	790
Avg	793.4	737.2	729.6	742.2	751
			Cycle No. 10		
22	743	730	693	678	711
23	804	767	758	738	767
24	844	784	764	759	788
25	869	808	770	781	807
26	891	825	789	801	826
Avg	830.2	782.8	754.8	751.4	800

Note: All cycles consisted of 1000 rounds.

Table 2.6-IV. Round-by-Round Function and Durability Test Data for Weapon No. 4

Magazine No.	Trial Number, Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
										Cycle No. 1										
27																				
28																				
29										None in This Cycle										
30																				
31																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
										Cycle No. 2										
27													1-FBR	20						
28																				
29																				
30													1-FBR	20						
31																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	2	-	0	-	0	-	0	-
										Cycle No. 3										
27																				
28																				
29																	1-FBR	20		
30																				
31																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-	0	-

Table 2.6-IV (Cont'd)

Magazine No.	Trial Number, Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
Cycle No. 4																				
27																				
28			1-FBR 20																	
29			1-FBR 20																	
30																				
31																				
Total	0	-	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 5																				
27																			1-FS	2
28					1-FBR 20												1-FBR 20		1-FC	4
29																	1-DF	19/20		
30													1-FBR 20							
31																				
Total	0	-	0	-	1	-	0	-	0	-	0	-	1	-	0	-	2	-	2	-
Cycle No. 6																				
27																	1-FBR 20		1-FBR 20	
28																				
29	1-FBR 20																			
30																				
31									1-FBR 20											
Total	1	-	0	-	0	-	0	-	1	-	0	-	0	-	0	-	1	-	1	-
Cycle No. 7																				
27									1-FBR 20				1-FBR 20							
28			1-FBR 20										1-FBR 20							
29			1-FBR 20								1-FBR 20									

Table 2.6-IV (Cont'd)

Magazine No.	Trial Number, Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
30																				
31																				
Total	0	-	2	-	0	-	0	-	1	-	1	-	2	-	0	-	0	-	0	-
Cycle No. 8																				
27																				
28																				
29																			1-FBR	20
30					1-FBR	20									1-FBR	20			1-FBR	20
31																				
Total	0	-	0	-	1	-	0	-	0	-	0	-	0	-	1	-	0	-	2	-
Cycle No. 9																				
27																			1-FBR	20
28																				
29					1-FBR	20														
30																				
31													1-FBR	20						
Total	0	-	0	-	1	-	0	-	0	-	0	-	1	-	0	-	0	-	1	-
Cycle No. 10																				
27																				
28					1-FBR	20														
29																				
30																				
31																				
Total	0	-	0	-	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Note: All cycles consisted of 1000 rounds.

Table 2.6-V. Function and Durability Test Data, Cyclic Rate of Weapon No. 4, Recorded During 20-Round Automatic Burst Firings

Magazine No.	Rate Recording Interval, rds				Avg
	1 to 100	301 to 400	601 to 700	901 to 1000	
			Cycle No. 1		
27	806	825	813	799	811
28	859	885	844	851	860
29	863	908	875	885	883
30	883	935	895	919	908
31	900	924	895	921	910
Avg	862.2	895.4	864.4	875.0	874
			Cycle No. 2		
27	798	762	706	690	739
28	829	804	727	730	772
29	847	863	741	747	800
30	851	869	781	750	813
31	863	891	767	775	824
Avg	837.6	837.8	744.4	738.4	790
			Cycle No. 3		
27	820	756	741	733	762
28	857	808	750	765	795
29	875	842	791	799	827
30	904	859	811	822	849
31	926	873	838	832	867
Avg	876.4	827.6	786.2	790.2	820
			Cycle No. 4		
27	806	724	699	706	734
28	832	759	740	756	772
29	855	788	764	784	798
30	863	804	788	811	816
31	867	825	791	818	825
Avg	844.6	780.0	756.4	775.0	789

Table 2.6-V (Cont'd)

Magazine No.	Rate Recording Interval, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
		Cycle No. 5			
27	767	731	699	676	718
28	811	775	750	708	761
29	831	798	765	741	784
30	867	823	791	768	812
31	902	851	808	759	830
Avg	835.6	795.6	762.6	730.4	781
		Cycle No. 6			
27	778	753	710	729	742
28	825	784	759	772	785
29	855	806	781	808	812
30	869	825	802	823	830
31	873	863	822	844	850
Avg	840.0	806.2	774.8	795.2	804
		Cycle No. 7			
27	744	750	727	719	735
28	811	768	747	759	771
29	844	794	772	788	800
30	871	827	804	791	823
31	889	838	836	799	840
Avg	831.8	795.4	777.2	771.2	794
		Cycle No. 8			
27	762	636	632	633	666
28	759	683	675	690	702
29	767	708	708	712	724
30	794	730	723	706	738
31	818	740	743	719	755
Avg	780.0	699.4	696.2	692.0	717

Table 2.6-V (Cont'd)

Magazine No.	Rate Recording Interval, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
		Cycle No. 9			
27	791	691	688	690	715
28	831	738	722	729	755
29	847	775	752	755	782
30	863	798	767	775	801
31	877	809	791	775	813
Avg	841.8	762.2	744.0	744.8	773
		Cycle No. 10			
27	798	778	770	781	782
28	851	808	829	818	826
29	889	840	849	836	854
30	904	871	889	859	881
31	930	879	897	887	898
Avg	874.4	835.2	846.8	836.2	848

Note: All cycles consisted of 1000 rounds.

Table 2.6-VI. Round-by-Round Function and Durability Test Data for Weapon No. 5

Magazine No.	Trial No., Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
Cycle No. 1																				
32																				
33																				
34																				
35																				
36					1-BOB-DR	3														
Total	0	-	0	-	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 2																				
32																				
33																				
34																				
35																				
36					1-FJ	17														
Total	0	-	0	-	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 3																				
32																				
33																				
34																				
35	2-FJ	12, 18																		
36																				
Total	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Table 2.6-VI (Cont'd)

Magazine No.	Trial No., Mode of Fire, and Occurrence of Malfunction																			
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
Cycle No. 4																				
32																				
33	1-FJ	2																		
34	1-FJ	15																		
35																				
36																				
Total	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Cycle No. 5																				
32			1-FS	1													1-FC	2	1-FC	2
																	1-FC	5		
33																				
34																				
35															1-FFR	2				
36																				
Total	0	-	1	-	0	-	0	-	0	-	0	-	0	-	1	-	2	-	1	-
Cycle No. 6																				
32																	4-FS	2 - 5		
33																				
34																				
35																				
36																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	4	-	0	-

Table 2.6-VI (Cont'd)

Magazine No.	Trial No., Mode of Fire, and Occurrence of Malfunction																	
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
								Cycle No. 7												
32			2-FTR	7, 15																
33																				
34																				
35																				
36																				
Total	0	-	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
								Cycle No. 8												
32																				
33																				
34								None in this cycle.												
35																				
36																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
								Cycle No. 9												
32																				
33																				
34																				
35																				
36	1-FJ	10																		
Total	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-

Table 2.6-VI (Cont'd)

Maga-zine No.	Trial No., Mode of Fire, and Occurrence of Malfunction																					
	1-A	Rd No.	2-S	Rd No.	3-B	Rd No.	4-A	Rd No.	5-S	Rd No.	6-B	Rd No.	7-A	Rd No.	8-S	Rd No.	9-B	Rd No.	10-A	Rd No.
Cycle No. 10																				
32																			1-FBR	20
33																				
34																				
35																				
36																				
Total	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	1	-

Note: All cycles consisted of 1000 rounds.

Table 2.6-VII. Function and Durability Test Data, Cyclic Rate of Weapon No. 5, Recorded During 20-Round Automatic Burst Firings

Magazine No.	Rate Recording Interval, rds				Avg
	1 to 100	301 to 400	601 to 700	901 to 1000	
			Cycle No. 1		
32	836	859	820	827	836
33	873	904	865	867	877
34	883	926	883	900	898
35	921	935	904	921	920
36	940	927	926	944	934
Avg	890.6	910.2	879.6	891.8	983
			Cycle No. 2		
32	825	788	727	726	766
33	832	838	765	762	799
34	836	859	772	775	810
35	847	887	798	806	834
36	873	904	804	823	851
Avg	842.6	855.2	773.2	778.4	812
			Cycle No. 3		
32	815	746	723	703	747
33	842	788	778	767	794
34	865	822	802	801	822
35	886	844	832	808	842
36	900	867	855	840	866
Avg	861.6	813.4	798.0	783.0	814
			Cycle No. 4		
32	855	743	719	722	760
33	891	770	753	749	791
34	914	808	781	767	818
35	904	820	791	786	825
36	917	844	794	811	842
Avg	896.2	797.0	767.6	767.0	807

Table 2.6-VII (Cont'd)

Magazine No.	Rate Recording Interval, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
		Cycle No. 5			
32	753	690	-	684	709
33	791	718	716	716	735
34	811	734	733	775	763
35	832	741	762	791	782
36	873	768	801	825	817
Avg	812.0	730.2	753.0	758.2	763
		Cycle No. 6			
32	788	750	710	659	727
33	806	784	738	716	761
34	855	811	755	744	791
35	897	825	772	744	810
36	908	859	788	781	834
Avg	850.8	805.8	752.6	728.8	784
		Cycle No. 7			
32	738	722	708	712	720
33	791	756	733	747	757
34	825	792	759	768	786
35	840	808	778	791	804
36	871	829	799	808	827
Avg	813.0	781.4	755.4	765.2	779
		Cycle No. 8			
32	747	678	661	665	688
33	772	693	683	708	714
34	753	696	716	722	722
35	765	722	722	733	736
36	801	719	749	762	758
Avg	767.6	701.6	706.2	718.0	723

Table 2.6-VII (Cont'd)

Magazine No.	Rate Recording Interval, rds 1 to 100	301 to 400	601 to 700	901 to 1000	Avg
		Cycle No. 9			
32	818	733	719	733	751
33	847	767	759	750	781
34	863	788	768	784	801
35	871	791	798	799	815
36	883	815	808	822	832
Avg	856.4	778.8	770.4	777.6	796
		Cycle No. 10			
32	822	762	758	671	753
33	883	780	778	744	796
34	900	804	808	762	818
35	908	831	815	775	832
36	935	847	836	791	852
Avg	889.6	804.8	799.0	748.6	810

Note: All cycles consisted of 1000 rounds.

SECTION 3. APPENDICES

APPENDIX I - TEST DATA

PHYSICAL TEST DATA

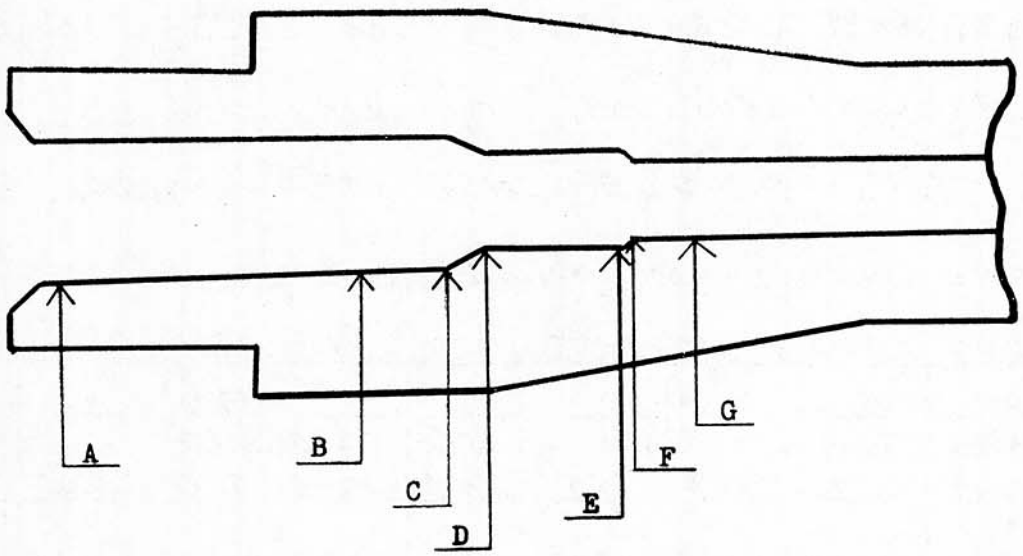

Figure I-1: Sketch of Chamber for M16A1 Rifle and XM177E2 Submachine Gun. Letters Indicate Positions of Recorded Measurements.

5.56 MM CHAMBER CAST MEAS M16A1

DISTANCE (INCHES) FROM NOMINAL BREECH FACE

.200 1.200 1.4337 1.558 1.778 1.815 2.0211

DIA.	A	B	C	D	E	F	G	A1	D1
SPEC'S	.3789	.3614	.3573	.257	.256	.2265	.220		
	.3769	.3594	.3553	.255	.254	.2245	.210	.200	1.558
NO.									
823316 CPC #1	.3804	.3601	.3557	.2590	.2550	.2276	.2240	.207	1.566
824652 CPC #2	.3840	.3606	.3560	.2605	.2547	.2284	.2230	.216	1.574
825090 CPC #3	.3800	.3605	.3557	.2582	.2537	.2272	.2238	.214	1.566
826757 CPC #4	.3833	.3599	.3552	.2590	.2544	.2279	.2238	.215	1.570
832375 CPC #5	.3797	.3607	.3559	.2591	.2541	.2283	.2236	.205	1.570

5.56 MM CHAMBER CAST MEAS. M16A1

DISTANCE (INCHES) FROM NOMINAL BREECH FACE

.200 1.200 1.4337 1.558 1.778 1.815 2.0211

DIA.	A	B	C	D	E	F	G	A1	D1
SPEC'S	.3789	.3614	.3573	.257	.256	.2265	.220		
	.3769	.3594	.3553	.255	.254	.2245	.210	.200	1.558
NO.									
786642	.3842	.3608	.3553	.2584	.2542	.2273	.2245	.220	1.569
788846	.3842	.3615	.3567	.2590	.2550	.2289	.2240	.225	1.574

"A1" IS THE DISTANCE WHERE THE DIAMETER FOR "A" FALLS
"D1" " " " " " " " " "D" "

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel

CASTING NUMBER	
MANUFACTURER	
MODEL	M16A1
NUMBER	8233/6 CPC#1
FIRING STATUS (Check One) BEFORE	✓
FIRING STATUS (Check One) AFTER	
NUMBER OF ROUNDS	BF HTRS
PROOF OFFICER	
5.56 MM Barrel	
DATE OF GAUGING	19 OCT 67

Dist. (inches) From Rear Face of Barrel	Dist. (inches) From Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0003	+.0003	+.0005	+.0003
19.70	2.00	4	3	7	3
18.70	3.00	4	3	5	5
17.70	4.00	4	3	4	4
16.70	5.00	4	3	4	4
15.70	6.00	4	4	4	5
14.70	7.00	3	3	4	4
13.70	8.00	3	3	5	5
12.70	9.00	3	4	6	5
11.70	10.00	3	3	6	6
10.70	11.00	2	3	6	6
9.70	12.00	2	4	6	7
8.70	13.00	2	3	7	6
7.70	14.00	4	3	8	7
6.70	15.00	4	3	8	8
5.70	16.00	4	4	8	8
4.70	17.00	3	4	8	9
3.70	18.00	4	4	8	8
3.35	18.35	4	4	8	8
2.85	18.85	3	4	8	8
2.60	19.10	+.0005	+.0004	+.0008	+.0008

BORESCOPE REMARKS: (CHAMBER CHROME PLATED)
Straight of chamber roughly machined circumferential tool marks beginning on chamfering slope and extending throughout bore. Light to moderate metal deposits determined to be on lands and back of lands throughout bore. Forward edge of gilsa port lightly eroded.

BY: SCHANTZ-MONK

STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

- 5.56 MM Barrel
- NUMBER: 824652 CPC #2
- MODEL: M16A1
- MANUFACTURER:
- CASTING NUMBER: X
- DATE OF GAUGING: 19 OCT. 67
- FIRING STATUS (Check One): BEFORE ✓ AFTER
- NUMBER OF ROUNDS: BF AT APG
- PROOF OFFICER:

5.56 MM Barrel

Dist. (inches) From: Rear Face of Barrel	Face of Flash Suppressor ✓	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0004	+.0003	+.0001	+.0001
19.70	2.00	3	3	1	1
18.70	3.00	3	3	1	1
17.70	4.00	2	3	1	1
16.70	5.00	1	1	1	1
15.70	6.00	1	1	0	1
14.70	7.00	0	0	-.0001	1
13.70	8.00	1	1	0	1
12.70	9.00	1	1	0	0
11.70	10.00	0	1	+.0001	0
10.70	11.00	2	0	1	1
9.70	12.00	2	0	1	1
8.70	13.00	2	2	2	1
7.70	14.00	3	2	2	1
6.70	15.00	2	2	2	1
5.70	16.00	3	2	2	1
4.70	17.00	4	2	2	2
3.70	18.00	3	2	2	3
3.35	18.35	3	3	2	3
2.85	18.85	3	3	2	3
2.60	19.10	+.0003	+.0003	+.0002	+.0002

BORESCOPE REMARKS: (CHAMBER CHROME PLATED)

Straight of chamber roughly machined. Circumferential tool marks beginning in centering slope and [illegible] throughout bore. Very light metal deposits on lands and base of lands throughout bore. Light wide edge at rear of gas port, with light chipping on forward ledge.

BY: SCHANTZ - MONK

STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

CASTING NUMBER	MANUFACTURER	MODEL	NUMBER	5.56 MM Barrel
X		M16A1	825090 CPC#3	

PROOF OFFICER	NUMBER OF ROUNDS	FIRING STATUS (Check One)	DATE OF GAUGING
	BF 197 RPG	BEFORE ✓ / AFTER	19 OCT 67

5.56 MM Barrel

Dist. (inches) From Rear Face of Barrel	Face of Flash Suppressor ✓	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	Hor.	Grooves .2235" Vert.	Hor.
20.	1.25	+.0003	+.0003	+.0007	+.0004
19.70	2.00	3	3	9	6
18.70	3.00	2	2	9	8
17.70	4.00	1	2	7	7
16.70	5.00	0	1	5	8
15.70	6.00	0	1	6	8
14.70	7.00	0	2	5	6
13.70	8.00	0	1	5	5
12.70	9.00	0	1	6	5
11.70	10.00	0	1	4	5
10.70	11.00	1	0	5	5
9.70	12.00	0	0	4	5
8.70	13.00	0	0	5	7
7.70	14.00	0	0	6	7
6.70	15.00	0	0	6	6
5.70	16.00	2	1	4	6
4.70	17.00	2	2	4	6
3.70	18.00	2	1	5	6
3.35	18.35	2	2	6	7
2.85	18.85	2	1	5	7
2.60	19.10	+.0001	+.0001	+.0005	+.0006

BORESCOPE REMARKS: (CHAMBER CHROME PLATED)

Slope and straight of chamber roughly machined. Circumferential land cracking beginning at leading slope and of leading [illegible] throughout bore. Very light [illegible] deposits at [illegible] of land [illegible] bore. [illegible] edge [illegible] with light [illegible] edge. Lands [illegible] at [illegible]

BY: SCHANTZ-[illegible]

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

CASTING NUMBER	MANUFACTURER	MODEL	NUMBER	
		M16A1	826757 CPC #4	5.56 MM Barrel

PROOF OFFICER:

NUMBER OF ROUNDS: BF AT APG

FIRING STATUS (Check One): BEFORE ✓ AFTER

DATE OF GAUGING: 19 OCT '67

5.56 MM Barrel

Dist. (inches) From		Meas. indicated in .0001 of an inch.			
		LANDS .2190"		Grooves .2235"	
Rear Face of Barrel	Face of Flash Suppressor ✓	Vert.	Hor.	Vert.	Hor.
20.	1.25	+.0003	+.0003	+.0004	+.0004
19.70	2.00	3	3	10	9
18.70	3.00	3	4	10	10
17.70	4.00	3	2	9	9
16.70	5.00	2	2	8	9
15.70	6.00	2	3	7	9
14.70	7.00	2	2	6	10
13.70	8.00	1	1	7	10
12.70	9.00	1	1	6	8
11.70	10.00	1	1	7	6
10.70	11.00	1	1	8	6
9.70	12.00	1	1	8	7
8.70	13.00	0	1	8	7
7.70	14.00	1	1	7	9
6.70	15.00	1	2	8	7
5.70	16.00	3	2	9	8
4.70	17.00	3	3	9	9
3.70	18.00	4	3	10	9
3.35	18.35	4	3	10	9
2.85	18.85	3	3	8	10
2.60	19.10	+.0002	+.0003	+.0009	+.0010

(CHAMBER CHROME PLATED)

BORESCOPE REMARKS: Slope and straight of chamber roughly machined. Clean of [illegible] [illegible] has begun [illegible] containing slope land [illegible] throughout bore. Edges of lands lightly chipped at commencement of rifling and appears to be slightly flattened. Very light metal deposits throughout [illegible] lower edge [illegible] gas port.

BY: SCHANTZ-MIANK

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel

CASTING NUMBER	MANUFACTURER	MODEL	NUMBER		PROOF OFFICER	NUMBER OF ROUNDS	FIRING STATUS (Check One)	DATE OF GAUGING
X		M16A1	832375 CPC #5	5.56 MM Barrel		BF M APG	BEFORE ✓ AFTER	19 OCT. '67

Dist. (inches) From Rear Face of Barrel	Face of Flash Suppressor ✓	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	Hor.	Grooves .2235" Vert.	Hor.
20.	1.25	+.0003	+.0003	+.0004	+.0003
19.70	2.00	5	3	5	4
18.70	3.00	4	3	5	4
17.70	4.00	3	3	4	3
16.70	5.00	3	3	4	3
15.70	6.00	4	2	4	5
14.70	7.00	4	0	2	3
13.70	8.00	5	0	5	3
12.70	9.00	5	0	3	2
11.70	10.00	0	0	2	2
10.70	11.00	1	−.0001	2	2
9.70	12.00	0	+.0001	2	2
8.70	13.00	1	0	2	2
7.70	14.00	1	1	3	2
6.70	15.00	0	1	3	2
5.70	16.00	0	2	4	2
4.70	17.00	3	2	4	3
3.70	18.00	3	2	5	4
3.35	18.35	3	2	5	4
2.85	18.85	3	2	5	4
2.60	19.10	+.0004	+.0002	+.0005	+.0004

BORESCOPE REMARKS: (CHAMBER CHROME PLATED)

Slope and straight of chamber roughly machined (circumferential tool marks) beginning in leading slope and extending throughout bore. Very light metal fouling throughout bore. Slight [illegible] edge encircling gas port

BY: SCHANTZ-NIONK

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel

CASTING NUMBER	MANUFACTURER	MODEL	NUMBER	FIRING STATUS (Check One)	NUMBER OF ROUNDS	PROOF OFFICER
		M16A1	7866412 (6)	BEFORE ✓ / AFTER	B.F. 3 P.G.	

5.56 MM Barrel — DATE OF GAUGING: NOV. 2, '67

Dist. (inches) From Rear Face of Barrel	Dist. (inches) From Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0007	+.0007	+.0009	+.0010
19.70	2.00	5	8	11	11
18.70	3.00	4	6	11	11
17.70	4.00	7	6	11	11
16.70	5.00	6	6	10	11
15.70	6.00	6	7	10	12
14.70	7.00	4	5	9	9
13.70	8.00	4	4	8	9
12.70	9.00	6	6	10	10
11.70	10.00	5	6	10	10
10.70	11.00	7	6	11	11
9.70	12.00	6	6	11	12
8.70	13.00	7	6	11	12
7.70	14.00	7	4	12	12
6.70	15.00	6	5	12	11
5.70	16.00	7	6	12	11
4.70	17.00	7	7	12	12
3.70	18.00	7	7	12	12
3.35	18.35	8	7	12	12
2.85	18.85	7	7	12	12
2.60	19.10	+.0008	+.0007	+.0012	+.0012

BORESCOPE REMARKS: (CHAMBER UNPLATED) Light circumferential tool marks encircling bullet seat, forcing cone, and lands and grooves throughout bore. Light erosion on forward edge of gas port

BY: SCHANTZ - MONY

STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel

CASTING NUMBER	X
MANUFACTURER	PROOF OFFICER E. MILLER W.O. 324-90-70
MODEL	M16A1
NUMBER	788846 (7)
FIRING STATUS (Check One) BEFORE / AFTER	
NUMBER OF ROUNDS	B.F. RIFG.
DATE OF GAUGING	NOV. 21, 67
5.56 MM Barrel	

Dist. (inches) From Rear Face of Barrel	Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	Hor.	Grooves .2235" Vert.	Hor.
20.	1.25	+.0005	+.0004	+.0008	+.0007
19.70	2.00	3	4	8	7
18.70	3.00	3	4	8	8
17.70	4.00	4	3	8	8
16.70	5.00	3	3	7	8
15.70	6.00	3	3	7	8
14.70	7.00	3	2	5	6
13.70	8.00	1	2	5	7
12.70	9.00	4	3	7	8
11.70	10.00	3	2	8	8
10.70	11.00	3	4	8	8
9.70	12.00	3	2	7	8
8.70	13.00	2	3	7	8
7.70	14.00	2	3	7	7
6.70	15.00	2	2	7	7
5.70	16.00	3	3	7	7
4.70	17.00	4	2	7	7
3.70	18.00	4	3	7	8
3.35	18.35	4	4	7	8
2.85	18.85	3	3	7	8
2.60	19.10	+.0004	+.0003	+.0007	+.0007

BORESCOPE REMARKS: (CHAMBER UNPLATED)
Moderate circumferential tool marks throughout bullet throat, freeing cone, and lands and grooves throughout bore. Light erosion on forward edge of gas port.

BY: SCHANTZ-MONK

5.56 M/M CAST MEAS. AF 500 RDS DUST TEST.

DISTANCE (INCHES) FROM NOMINAL BREACH FACE

			1.558	1.778				
	.200	1.200	1.4337	1.552	1.772	1.815	2.0211	
DIA	A	B	C	D	E	F	G	A1
SPEC'S	.3789	.3614	.3573	.257	.256	.2265	.220	
	.3769	.3594	.3553	.255	.254	.2245	.210	.200
NO								
786642	.3846	.3614	.3576 (1.4326)	.2569 (1.549)	.2555 (1.772)	.2287	.2255	.247
788846	.3845	.3622	.3577 (1.4316)	.2566 (1.552)	.2564 (1.772)	.2294	.2253	.256
823316	.3810	.3604	.3566 (1.4346)	.2554 (1.552)	.2559 (1.7756)	.2279	.2250	.225
824652	.3835	.3610	.3569 1.4333	.2568 (1.550)	.2560 (1.772)	.2288	.2250	.250
		AF DYNAMIC DUST TEST				DEC. 4, 1967		
786642	.3843	.3614	.3576 (1.4326)	.2578 (1.549)	.2560 (1.772)	.2285	.2250	.247
788846	.3838	.3619	.3577 (1.4316)	.2585 (1.552)	.2560 (1.772)	.2290	.2249	.256
823316	.3809	.3602	.3553 1.4346	.2563 1.552	.2553 (1.7756)	.2271	.2245	.225
824652	.3828	.3605	.3560 1.4333	.2573 1.550	.2551 1.772	.2283	.2244	.248

A1 IS THE DISTANCE WHERE THE DIAMETER FOR "A" FALLS.

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrels M16A1

BORESCOPE REMARKS: AFTER DYNAMIC DUST TEST

Barrel Number 823316

Light longitudianl abrasive scratches in main powder chamber. Moderate circumferential tool marks with moderate abrasive wear encircling the chamber slope to bullet seat. Heavy to light abrasive wear beginning at origin of rifling and extending forward (approx.) 2.25". Driving edge of lands obliterated throughout this area. Light metal deposits from origin of rifling forward (approx.) 6.50", becoming heavy to extremely heavy from this point forward to within 1" of muzzle. Light metal deposits in last inch at muzzle. Heavy erosion on forward edge of gas port.

Barrel Number 824652

Very light nicks and scratches in main powder chamber. Light heat checking between forward part of straight of chamber and bullet centering slope. Circumferential tool marks beginning in slope of chamber and extending throughout the bore. Heavy to light abrasive wear beginning at origin of rifling and extending forward (approx.) 2.00". Driving edges of lands heavily worn in this area. Light metal deposits in bore from commencement of rifling forward (approx.) 6", with heavy to very heavy deposits in the remainder of the bore. This condition is more pronounced in the grooves. Heavy abrasive wear on the forward edge of the gas port. Moderate carbon deposits at the muzzle end of the barrel and flash suppressor.

Barrel Number 786642

Light longitudinal abrasive scratches in the main powder chamber. Light circumferential tool marks with light abrasive wear encircling the chamber slope and bullet seat. Several heavy circumferential gouges at origin of rifling. Heavy to light abrasive wear beginning at origin of rifling and extending forward (approx.) 2". Driving edge of lands obliterated in this area. Moderate circumferential tool marks throughout the bore. heavy metal deposits from (approx.) 9" forward of origin of rifling to within 1" of muzzle. Light metal deposits in remainder of bore. Heavy erosion on forward edge of gas port.

Barrel Number 788846

Very light abrasive wear in main powder chamber. Heavy circumferential tool marks beginning on chamber slope and extending throughout bore. Heavy to light abrasive wear beginning at origin of rifling and extending forward (approx.) 2". Driving edges of lands obliterated in this area. Light to moderate metal deposits from origin of rifling forward (approx.) 5"Heavy to very heavy metal metal deposits 5" forward to muzzle end, more pronounced in the grooves. Moderate erosion on forward edge of gas port.

5.56 MM CAST MEAS. After 6000 RDS FUNCTION + DURABILITY

DISTANCE (INCHES) FROM NOMINAL BREECH FACE

.200 1.200 1.4337 1.558 1.552 1.778 1.772 1.815 2.0211

DIA.	A	B	C*	D*	E*	F	G	A1	
SPECS	.3789	.3614	.3573	.257	.256	.2265	.220		
	.3769	.3594	.3553	.255	.254	.2245	.210	.200	
NO.									
825090	.3802	.3605	.3565	.2559	.2548	.2277	.2245	.3784	DIA
			(1.4315	X1.5484	X1.7748)			.224	DIST.
826757	.3831	.3600	.3554	.2563	.2545	.2273	.2233	.3784	DIA
			(1.4336	X1.5475	X1.7755)			.227	DIST.
832375	.3803	.3614	.3571	.2569	.2554	.2295	.2239	.3788	DIA
			(1.4304	X1.5479	X1.7739)			.236	DIST.

NOTE: * C, D + E ARE DIST. + DIA. TO SHARP CORNERS.
A1 IS ~~the distance where the diameter is~~ "full"

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

Field	Entry
5.56 MM Barrel	
NUMBER	825090 #3
MODEL	M16A1
MANUFACTURER	
CASTING NUMBER	X
DATE OF GAUGING	5 DEC 1967
FIRING STATUS (Check One)	BEFORE / AFTER ✓
NUMBER OF ROUNDS	6000 — FUNCTION + DURABILITY
PROOF OFFICER	

5.56 MM Barrel

Dist. (inches) From Rear Face of Barrel	Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0005	+.0004	+.0007	+.0007
19.70	2.00	3	3	8	8
18.70	3.00	3	3	8	8
17.70	4.00	3	3	4	6
16.70	5.00	3	3	3	2
15.70	6.00	3	3	2	2
14.70	7.00	2	1	5	2
13.70	8.00	-.0002	1	2	.0000
12.70	9.00	3	-.0003	2	0
11.70	10.00	3	6	6	+.0009
10.70	11.00	+.0003	+.0001	8	9
9.70	12.00	3	3	8	8
8.70	13.00	3	2	8	8
7.70	14.00	1	2	8	7
6.70	15.00	1	1	8	8
5.70	16.00	1	2	8	7
4.70	17.00	2	1	7	7
3.70	18.00	1	.0000	6	9
3.35	18.35	.0000	0	9	9
2.85	18.85	+.0001	3	8	8
2.60	19.10	+.0006	+.0006	+.0008	+.0007

BORESCOPE REMARKS:

Light erosion in main powder chamber. Circumferential tool marks beginning at slope of chamber and extending forward thru-out bore. Light dark streaking beginning at bullet centering slope and extending forward approx. 3.60". Light wear wash from bullet centering slope forward approx. .50". Heavy chipping of lands at commencement of rifling. Forward edge of gas port has heavy erosion. Light to moderate metal deposits in bore from origin of rifling forward approx. 9.50", moderate to heavy to approx. 14.00", with light deposits to muzzle end.

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STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

NUMBER	826757 #4
MODEL	M16A1
MANUFACTURER	
CASTING NUMBER	X
FIRING STATUS (Check One)	BEFORE: — AFTER: ✓
NUMBER OF ROUNDS	6000
PROOF OFFICER	
	FUNCTION + DURABILITY
DATE OF GAUGING	5 DEC 1967
	5.56 MM Barrel

5.56 MM Barrel

Dist. (inches) From		Meas. indicated in .0001 of an inch.			
Rear Face of Barrel	Face of Flash Suppressor	LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0004	+.0004	+.0008	+.0008
19.70	2.00	4	4	11	10
18.70	3.00	4	4	10	10
17.70	4.00	3	4	8	1
16.70	5.00	5	-.0003	.0000	-.0002
15.70	6.00	5	+.0004	+.0005	+.0002
14.70	7.00	2	3	1	7
13.70	8.00	*	-.0002	2	5
12.70	9.00	*	1	3	2
11.70	10.00	*	*	7	5
10.70	11.00	-.0005	-.0005	10	9
9.70	12.00	+.0008	+.0003	9	9
8.70	13.00	4	3	8	9
7.70	14.00	2	2	8	9
6.70	15.00	2	.0000	8	9
5.70	16.00	2	+.0002	8	8
4.70	17.00	3	4	9	8
3.70	18.00	5	4	10	10
3.35	18.35	4	5	12	11
2.85	18.85	4	6	10	10
2.60	19.10	+.0008	+.0008	+.0008	+.0009

BORESCOPE REMARKS:

* GAGE WOULD NOT ENTER

BORESCOPE

Light nicks and scratches in main powder chamber. Light to heavy circumferential tool marks from slope of chamber and extending through throat area. Light heat checking beginning at rear portion of bullet centering slope and extending approx. 3.50" forward. Light gas wash beginning at bullet centering slope and extending forward approx. 1.50". Heavy chipping of lands at commencement of rifling. Forward edge of gas port has heavy erosion. Light to moderately metal deposits in bore from origin of rifling to approx. 6" forward, and heavy to heavy [illegible] in remainder of bore.

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STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel

CASTING NUMBER: X

MANUFACTURER:

MODEL: M16A1

NUMBER: 832375 #5

FIRING STATUS (Check One): BEFORE / AFTER ✓

NUMBER OF ROUNDS: 6000 FUNCTION & DURABILITY

PROOF OFFICER:

DATE OF GAUGING: 5 DEC 1967

5.56 MM Barrel

Dist. (inches) From Rear Face of Barrel	Dist. (inches) From Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.25	+.0004	+.0005	+.0004	+.0004
19.70	2.00	5	4	4	4
18.70	3.00	5	4	3	.0000
17.70	4.00	4	4	*	*
16.70	5.00	*	*	*	*
15.70	6.00	*	*	*	*
14.70	7.00	*	*	*	*
13.70	8.00	*	*	*	*
12.70	9.00	*	*	*	*
11.70	10.00	*	*	*	*
10.70	11.00	*	-.0005	-.0004	*
9.70	12.00	+.0001	+.0001	+.0001	.0000
8.70	13.00	1	1	3	+.0003
7.70	14.00	.0000	1	2	3
6.70	15.00	+.0002	.0000	3	3
5.70	16.00	1	+.0002	2	3
4.70	17.00	1	3	3	3
3.70	18.00	1	1	3	3
3.35	18.35	2	2	4	3
2.85	18.85	3	5	3	4
2.60	19.10	+.0004	+.0004	+.0003	+.0004

BORESCOPE REMARKS:

* GAGE WOULD NOT ENTER

LIGHT NICKS AND SCRATCHES IN MAIN POWDER CHAMBER. CIRCUMFERENTIAL TOOL MARKS BEGINNING IN SLOPE of Chamber and extending throughout bore. Light heat check on rear portion of bullet contacting slope, with light erosion forward approx. 50". Heavy chipping of lands at commencement of rifling. Forward edge of gas port has heavy erosion. Light to moderate metal deposits in bore from origin of rifling to approx. 6" forward, and heavy to very heavy metal deposits to muzzle end.

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STEAP-DS Form 106 (Part I) 17 JUNE 64

5.56 MM CAST MEAS. After 6000 RDS FUNCTION & DURABILITY

DISTANCE (INCHES) FROM NOMINAL BREECH FACE

DIA.	.200 A	1.200 B	1.4337 C*	1.558 1.552 D*	1.778 1.772 E*	1.815 F	2.0211 G	A1
				AFTER 8000 RDS. DEC. 8, 1967				
825090	.3804	.3605	.3563 (1.4315)	.2556 (1.5484)	.2548 (1.7748)	.2276	.2241	.3784 DIA. .224 DIST.
826757	.3837	.3600	.3554 1.4336	.2564 1.5475	.2544 1.7755	.2284	.2250	.3783 DIA. .227 DIST.
832375	.3801	.3613	.3567 1.4304	.2564 1.5479	.2549 1.7739	.2290	.2239	.3786 DIA .236 DIST.

NOTE: * C, D + E ARE DIST. + DIA. TO SHARP CORNERS.
A1 IS [illegible]

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrels M16A1

CASTING NUMBER: X

MANUFACTURER:

PROOF OFFICER:

MODEL:

NUMBER OF ROUNDS: 8000

NUMBER:

FIRING STATUS (Check One): BEFORE / X AFTER

DATE OF INSPECTION: 8 December 1967

Borescope Remarks: After Firing 8000 Rounds.

Barrel No. 825090 (CPC #3)
Light scratches in main powder chamber. Light to moderate circumferential tool marks beginning in chamber slope and extending throughout bore. Light heat checking beginning in forward portion of straight of chamber and extending forward (approx.) 3". Very light gas wash beginning in bullet centering slope and extending forward (approx.) 1". Very heavy chipping of lands at commencement of rifling with light gas erosion. Heavy erosion on forward edge of gas port. Light metal deposits in bore beginning at breech end forward (approx.) 12", with heavy to very heavy deposits in remainder of bore, more pronounced in grooves. Very heavy carbon deposits around muzzle face in flash suppressor.

Barrel No. 826757 (CPC #4).
Light nicks and scratches in main powder chamber. Light to heavy circumferential tool marks from chamber slope forward to muzzle end. Light heat checking beginning at bullet centering slope and extending forward (approx.) 3.50", with moderate to light gas wash in same area. Very heavy chipping of lands at commencement of rifling and extending forward (approx.) .75". Heavy gas erosion on forward edge of gas port. Light metal deposits in bore from breech to (approx.) 13", forward with heavy to very heavy deposits in the remainder of bore. Very heavy carbon deposits around muzzle face in flash suppressor.

Barrel No. 832375 (CPC #5).
Light nicks and scratches in main powder chamber. Light to moderate circumferential tool marks beginning in slope of chamber and extending throughout bore. Moderate to light heat checks and gas wash beginning at bullet centering slope and extending forward (approx.) 2". Very heavy chipping of lands at commencement of rifling, with moderate erosion forward (approx.) 1". Several light chips on lands intermittently throughout the bore. Heavy gas erosion on forward edge of gas port. Light metal deposits in bore at breech and extending forward (approx.) 12", with heavy to very heavy deposits in the remainder of the bore. Very heavy carbon deposits around muzzle face in flash suppressor.

ORDBG Form 2045-(R), Reinstated 9 Jul 59 (Part 1)

5.56 MM CAST MEAS. Function and Durability Test, AF 10,000 RDS

DISTANCE (INCHES) FROM NOMINAL BREECH FACE.

	.200	1.200	1.4337	1.558 1.552	1.778 1.772	1.815	2.0211	
DIA	A	B	C	D	E	F	G	A1
SPECS	.3789	.3614	.3573	.257	.256	.2265	.220	
	.3769	.3594	.3553	.255	.254	.2245	.210	.200
NO.								
825090	.3806	.3616	.3575	.2575	.256	.2295	.2254	.222
			1.4315	1.5484	1.7748			.3787
826757	.3837	.3606	.3562	.2576	.2550	.2297	.2255	.228
			1.4336	1.5475	1.7755			.3788
832375	.3806	.3612	.3564	.2553	.2544	.2288	.2248	.236
			1.4304	1.5479	1.7739			.3787

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel	
NUMBER	825090 (3)
MODEL	M16A1
MANUFACTURER	
CASTING NUMBER	X
DATE OF GAUGING	12 DEC 67
FIRING STATUS (Check One)	BEFORE / AFTER: ✓ AFTER
NUMBER OF ROUNDS	10 000
PROOF OFFICER	F. MILLER 710-324-960-80

5.56 MM Barrel

Dist. (inches) From		Meas. indicated in .0001 of an inch.			
Rear Face of Barrel	Face of Flash Suppressor	LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.	+.0002	+.0002	+.0005	+.0004
19.70	2.00	2	1	3	4
18.70	3.00	*	*	*	*
17.70	4.00	*	*	*	*
16.70	5.00	*	*	*	*
15.70	6.00	*	*	*	*
14.70	7.00	*	*	*	*
13.70	8.00	*	*	*	*
12.70	9.00	*	*	*	*
11.70	10.00	*	*	*	*
10.70	11.00	-.0006	-.0006	+.0002	+.0003
9.70	12.00	-.0002	-.0002	3	4
8.70	13.00	1	0	5	5
7.70	14.00	1	+.0002	7	7
6.70	15.00	+.0001	2	7	6
5.70	16.00	0	1	6	6
4.70	17.00	0	+.0001	6	6
3.70	18.00	-.0001	-.0002	7	6
3.35	18.35	5	6	6	7
2.85	18.85	5	5	4	6
2.60	19.10	-.0002	-.0003	+.0006	+.0006

* GAGE WOULD NOT ENTER

BORESCOPE REMARKS: (CHAMBER CHROME PLATED).
Light erosion and heat checking encircling the forward edge of the straight of chamber. Light flaking of chrome plating from the centering cylinder to the forward edge of the straight of chamber. Heavy pitting encircling the bullet seat forward to the commencement of rifling. Heavy chipping and flaking of lands from the commencement of rifling to (approx.) 2.25" forward. Heavy pitting in the grooves throughout this area. Heavy to moderate deposits of metal from the muzzle end to (approx.) 10.00" rearward. This condition is more pronounced in the grooves and at the base of the lands. Moderate to light deposits of metal throughout the remainder of the bore. Heavy erosion on the forward edge of the gas port.

STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

Item	Number	Model	Manufacturer	Casting Number
5.56 MM Barrel	826757 (4)	M16A1		X

Date of Gauging	Firing Status (Check One)	Number of Rounds	Proof Officer
12 DEC 67	Before: — After: ✓	10 008	F. Miller [illegible] 324-960-80

5.56 MM Barrel

Dist. (inches) From		Meas. indicated in .0001 of an inch.			
		LANDS .2190"		Grooves .2235"	
Rear Face of Barrel	Face of Flash Suppressor	Vert.	Hor.	Vert.	Hor.
20.	1.35	+.0003	+.0003	+.0007	+.0009
19.70	2.00	4	3	10	9
18.70	3.00	3	3	10	10
17.70	4.00	3	4	10	9
16.70	5.00	4	4	07	8
15.70	6.00	4	3	9	9
14.70	7.00	2	1	9	6
13.70	8.00	3	2	9	6
12.70	9.00	3	3	9	8
11.70	10.00	3	4	10	10
10.70	11.00	2	3	10	10
9.70	12.00	2	4	10	10
8.70	13.00	2	3	10	10
7.70	14.00	2	2	10	9
6.70	15.00	2	2	9	8
5.70	16.00	3	3	8	8
4.70	17.00	2	3	8	9
3.70	18.00	2	4	11	11
3.35	18.35	3	3	12	12
2.85	18.85	18	18	11	10
2.60	19.10	+.0034	+.0031	+.0012	+.0010

BORESCOPE REMARKS: (Chamber Chrome Plated). Light erosion and heat checking encircling the forward edge of the straight of chamber. Heavy pitting and flaking of chrome plating from the centering cylinder to the forward edge of the straight of chamber, in the 6 O'Clock position. Heavy pitting encircling the bullet seat forward to the commencement of rifling. Heavy chipping and flaking of lands from the commencement of rifling to (approx.) 1.50" forward. Heavy pitting in the grooves throughout this area. Heavy to moderate deposits of metal from the muzzle end to (approx.) 10" rearward. This condition is more pronounced in the grooves and at the base of the lands. Moderate to light deposits throughout the remainder of the bore. Heavy erosion on the forward edge of the gas port.

STEAP-DS Form 106 (Part I) 17 JUNE 64

MULTIPLE STARGAGE MEASUREMENT & INSPECTION DATA FORM

5.56 MM Barrel	NUMBER	MODEL	MANUFACTURER	CASTING NUMBER
	832375 (5)	M16A1		X

DATE OF GAUGING	FIRING STATUS (Check One)	NUMBER OF ROUNDS	PROOF OFFICER
12 DEC 67	BEFORE ☐ AFTER ✓	10000	F. MILLER 440-324-960-80

5.56 MM Barrel

Dist. (inches) From Rear Face of Barrel	Dist. (inches) From Face of Flash Suppressor	Meas. indicated in .0001 of an inch. LANDS .2190" Vert.	LANDS .2190" Hor.	Grooves .2235" Vert.	Grooves .2235" Hor.
20.	1.35	+.0005	+.0004	+.0005	+.0005
19.70	2.00	3	4	5	5
18.70	3.00	2	4	5	4
17.70	4.00	3	6	6	4
16.70	5.00	4	5	5	4
15.70	6.00	5	4	4	3
14.70	7.00	4	3	4	4
13.70	8.00	3	3	*	*
12.70	9.00	*	*	*	*
11.70	10.00	*	*	*	*
10.70	11.00	+.0003	+.0003	*	*
9.70	12.00	3	3	5	5
8.70	13.00	4	3	5	6
7.70	14.00	2	2	5	5
6.70	15.00	2	1	4	5
5.70	16.00	3	2	5	5
4.70	17.00	2	2	5	5
3.70	18.00	1	+.0002	4	6
3.35	18.35	1	0	5	6
2.85	18.85	2	+.0002	5	6
2.60	19.10	+.0000	-.0003	+.0005	+.0006

*GAGE WOULD NOT ENTER

BORESCOPE REMARKS: (Chamber Chrome Plated). Light to heavy pitted erosion with heat checking encircling the forward edge of straight of chamber, bullet seat and extending forward to the commencement of rifling. Heavy chipping and flaking of lands from the commencement of rifling forward to (approx.) 1.50" Heavy pitting in the grooves throughout this area. Light deposits of metal extending throughout bore. This condition is more pronounced in the grooves and at the base of the lands in the muzzle third of bore. Heavy erosion on forward half of gas port.

STEAP-DS Form 106 (Part I) 17 JUNE 64

Table I-I. Magazine Inspection, Dust Tests

Magazine No.	Feed-Lip Width Before Test[a], in.		
	Empty	Loaded	Change
1	0.456	0.460	+0.004
2	.453	.455	.002
3	.453	.456	.003
4	.450	.453	.003
5	.447	.451	.004
6	.454	.455	.001
7	.448	.451	.003
8	.449	.450	.001
9	.455	.456	.001
10	.448	.450	.002
11	.453	.454	.001
[b]12	.443	.443	.000
13	.451	.455	.004
14	.450	.455	.005
15	.448	.451	.003
16	.454	.455	.001
17	.445	.447	.002
18	.448	.450	.002
19	.452	.453	.001
20	.445	.447	.002
21	.449	.452	.003

[a]Prior to tests, the front and rear widths of the feed-lips were the same.

[b]The center section (right side) of the magazine body is recessed below the outside sections, causing the follower to drag in the magazine. Function performance was not affected by this condition.

Table I-II. Magazine Inspection, 10,000-Round Function and Durability Test

Magazine No.	Feed-Lip Width Before Test			Loaded, Feed-Lip Width after 60 Reloadings			Loaded, Feed-Lip Width after 100 Reloadings		
	Empty	Loaded	Change	Front	Rear	Change	Front	Rear	Change
22	0.454	0.455	+0.001	0.465	0.477	+0.012	0.468	0.481	+0.013
23	.447	.449	.002	.460	.464	.004	.460	.467	.007
24	.450	.454	.004	.464	.478	.014	.466	.480	.014
25	.450	.453	.003	.469	.477	.008	.472	.485	.013
26	.448	.451	.003	.467	.482	.005	.470	.485	.015
27	.449	.452	.003	.460	.465	.005	.460	.466	.006
28	.447	.450	.003	.464	.473	.009	.465	.474	.009
29	.448	.450	.002	.468	.480	.012	.471	.482	.011
30	.455	.455	.000	.470	.481	.011	.473	.482	.009
31	.451	.456	.005	.472	.484	.012	.472	.487	.015
32	.451	.453	.002	.468	.478	.010	.469	.481	.012
33	.454	.455	.001	.465	.470	.005	.465	.472	.007
34	.454	.457	.003	.470	.478	.008	.470	.480	.010
35	.456	.459	.003	.468	.476	.008	.468	.476	.008
36	.451	.453	.002	.460	.467	.007	.461	.467	.006

Note: All measurements are in inches.

Table I-III. Magazine Inspection, Temperature and Humidity Test

Magazine No.	Feed-Lip Width Before Test, in.			Magazine No.	Feed-Lip Width Before Test, in.		
	Empty	Loaded	Change		Empty	Loaded	Change
37	0.453	0.455	+0.002	47	0.452	0.455	+0.003
38	.455	.456	.001	48	.453	.456	.003
39	.453	.455	.002	49	.452	.455	.003
40	.454	.457	.003	50	.450	.455	.005
41	.455	.456	.001	51	.450	.456	.006
42	.450	.453	.003	52	.453	.455	.002
43	.444	.446	.002	53	.449	.453	.004
44	.449	.452	.003	54	.460	.466	.006
45	.452	.456	.004	55	.441	.443	.002
46	.451	.454	.003	56	.451	.453	.002

Table I-IV. Round-by-Round Static Dust Test Data for Weapon No. 1

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions				Immediate Action		No. Bursts	Cyclic Rate, rd/min
			FS1	FS2	Stub-1	FC-4	BCA	CHA		
1	S	20	1				2			
2	B	40	1				3		4	
				1			1			
3	A	60	1				2			666
				1			1			
4	S	80	1				2			
5	B	100	1				4		6	
		Subtotal	5	2	0	0				
		Cool Weapon and Clean Magazines Only								
1	B	120							7	
2	A	140	1				1			703
3	S	160	1				3			
4	B	180							6	
5	A	200	1				3			789
		Subtotal	3	0	0	0				
		Cool Weapon and Clean Magazines Only								
1	A	220	1				2			758
2	S	240								
3	B	260							7	
4	A	280	1				6			
5	S	300								804
		Subtotal	2	0	0	0				
		Cool Weapon and Clean Magazines Only								
1	S	320								
2	B	340							7	
3	A	360	1				2			758
4	S	380								
5	B	400							7	
		Subtotal	1	0	0	0				

Table I-IV (Cont'd)

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions				Immediate Action		No. Bursts	Cyclic Rate, rd/min
			FS1	FS2	Stub-1	FC-4	BCA	CHA		
1	B	420							8	
2	A	440	1				1			723
						1	2			
3	S	460	1				4			
4	B	480							7	
5	A	500	1				2			778
	Subtotal		3	0	0	1				
Total, all trials			14	2	0	1				

Aggregate of all Type I malfunctions = 17.

Prepare weapon and magazine for dynamic dust test.

BCA = Bolt-closure assist device.
CHA = Changing-handle assist (retraction of bolt and release from rearward position).

Note: The total repetitions of use to accomplish chambering the round are indicated by the number given in BCA and CHA columns.

Table I-V. Round-by-Round Static Dust Test Data for Weapon No. 2

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions				Immediate Action		No. Bursts	Cyclic Rate, rd/min
			FS1	FS2	Stub-1	FC-4	BCA	CHA		
6	S	20	1				1			
7	B	40	1				2		7	
8	A	60	1				2			791
9	S	80			1		3	1		
10	B	100	1				5		7	
	Subtotal		4	0	1	0				
	Cool Weapon and Clean Magazines Only									
6	B	120							7	
7	A	140	1				1			811
8	S	160	1				1			
9	B	180	1				1		6	
10	A	200	1				1			879
	Subtotal		4	0	0	0				
	Cool Weapon and Clean Magazines Only									
6	A	220								818
7	S	240	1				3			
8	B	260							7	
9	A	280								875
10	S	300								
	Subtotal		1	0	0	0				
	Cool Weapon and Clean Magazines Only									
6	S	320								
7	B	340	1				1		7	
8	A	360	1				1			818
9	S	380	1				3			
10	B	400							7	
	Subtotal		3	0	0	0				

Table I-V (Cont'd)

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions FS1	FS2	Stub-1	FC-4	Immediate Action BCA	CHA	No. Bursts	Cyclic Rate, rd/min
			Cool Weapon and Clean Magazines Only							
6	B	420							8	
7	A	440	1				1			791
8	S	460	1				1			
9	B	480	1				1		7	
10	A	500	1				1			861
	Subtotal		4	0	0	0				
Total, all trials			16	0	1	0				

Aggregate of all type I malfunctions = 17.

Table I-VI. Round-by-Round Static Dust Test Data for Weapon No. 6

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions FS1	FS2	Stub-1	FC-4	Immediate Action BCA	CHA	No. Bursts	Cyclic Rate, rd/min
11	S	20								
12	B	40	1				1		8	
13	A	60	1				2			714
14	S	80	1				1			
15	B	100	1				1		7	
	Subtotal		4	0	0	0				
			Cool Weapon and Clean Magazines Only							
11	B	120							7	
12	A	140	1				1			759
13	S	160	1				1			
14	B	180	1				1		7	
15	A	200	1				1			791
	Subtotal		4	0	0	0				

Table I-VI (Cont'd)

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions FS1	FS2	Stub-1	FC-4	Immediate Action BCA	CHA	No. Bursts	Cyclic Rate, rd/min
			Cool Weapon and Clean Magazines Only							
11	A	220								753
12	S	240	1				1			
13	B	260	1				1		7	
14	A	280	1				2			784
15	S	300	1				1			
		Subtotal	4	0	0	0				
			Cool Weapon and Clean Magazines Only							
11	S	320								
12	B	340	1				1		7	
13	A	360	1				2			768
14	S	380	1				1			
15	B	400			1		1	3	7	
		Subtotal	3	0	1	0				
			Cool Weapon and Clean Magazines Only							
11	B	420							8	
12	A	440	1				1			781
13	S	460	1				1			
14	B	480	1				1		7	
15	A	500	1				1			759
		Subtotal	4	0	0	0				
Total, all trials			19	0	1	0				

Aggregate of all type I malfunctions = 20.

Table I-VII. Round-by-Round Static Dust Test Data for Weapon No. 7

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions				Immediate Action		No. Bursts	Cyclic Rate, rd/min
			FS1	FS2	Stub-1	FC-4	BCA	CHA		
16	S	20							7	
17	B	40								638
18	A	60	1				3			
19	S	80	1				1			
20	B	100	1				1		7	
	Subtotal		3	0	0	0				
	Cool Weapon and Clean Magazines Only									
16	B	120							7	
17	A	140								773
18	S	160	1				1			
19	B	180	1				1		7	
20	A	200	1				2			859
	Subtotal		3	0	0	0				
	Cool Weapon and Clean Magazines Only									
16	A	220	1				1			778
17	S	240	1				2			
18	B	260	1				1		6	
19	A	280	1				2			823
20	S	300	1				3			
				1			1			
	Subtotal		5	1	0	0				
	Cool Weapon and Clean Magazines Only									
16	S	320	1				1		6	
17	B	340								794
18	A	360	1				1			
19	S	380	1				1			
20	B	400	1				6		8	
	Subtotal		4	0	0	0				

Table I-VII (Cont'd)

Magazine No.	Mode of Fire	Cumulative No. Rds Fired	Type I Malfunctions				Immediate Action		No. Bursts	Cyclic Rate, rd/min
			FS1	FS2	Stub-1	FC-4	BCA	CHA		
Cool Weapon and Clean Magazines Only										
16	B	420	1				5		7	
17	A	440	1				1			811
18	S	460	1				1			
19	B	480	1				1		6	
20	A	500	1				1			778
		Subtotal	5	0	0	0				
Total, all trials			20	1	0	0				

Aggregate of all type I malfunctions = 21.

Table I-VIII. Cyclic Rates of Dynamic Dust Weapons Prior to Each Dust-Type Environment[a]

Magazine Sequence	Cumulative No. Rds Fired	Pretest Phase and Weapon Number[a]																			
		Silica Flour				Pleiku				Lai-Khe				Cam Ranh-Bay				Silica Flour			
		1	2	6	7	1	2	6	7	1	2	6	7	1	2	6	7	1	2	6	7
First	20	791	-	851	847	833	867	831	840	-	883	863	887	-	832	815	831	855	861	825	844
Second	40	791	887	891	881	825	885	838	877	-	895	891	904	825	855	847	844	871	887	844	869
Third	60	-	908	895	887	829	891	853	883	887	910	904	915	856	871	859	873	897	904	859	881
Fourth	80	840	912	902	900	859	889	859	900	891	895	912	912	861	883	863	871	912	917	869	904
Fifth	100	847	917	902	904	861	891	859	900	895	926	917	926	857	891	867	879	926	935	885	917
Sixth	120	847	912	908	883	893	895	877	900	893	908	912	930	891	879	871	891	926	930	877	926
Seventh	140	855	912	912	900	902	908	887	912	912	935	944	926	912	891	861	875	926	917	885	926
First 5-magazine average		817	906	888	884	841	885	848	880	891	902	897	909	850	866	850	860	892	901	856	883
7-magazine average		828	908	894	886	857	889	858	887	896	907	906	914	867	872	855	866	902	907	863	895

[a]Rate in rd/min.
Weapons 1 and 2 with chrome-plated chambers; 6 and 7 with nonplated chambers.

Table I-IX. Cyclic Rate of Fire and Magazine Change Times, Silica Flour Dust

Weapon No. 1				Weapon No. 2				Weapon No. 6				Weapon No. 7			
Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/mi	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min
1	1	Loaded	772	8	1	Loaded	844	15	1	Loaded	822	15	1	Loaded	842
2		36.3	714	9		24.9	808	16		22.2	781	16		17.2	794
3		36.3	716	10		25.0	815	17		16.3	778	17		15.1	784
4		19.3	698	11		21.0	832	18		12.9	815	18		17.0	738
5		23.1	742	12		16.5	867	19		21.5	788	19		12.8	724
6		18.0	750	13		12.0	871	20		13.5	808	20		14.0	744
7		17.5	762	14		12.4	875	21		12.6	806	21		15.2	-
Average		25.1	736	Average		18.6	845	Average		16.5	800	Average		15.2	771
Total time, min	[a]2.8			Total time, min	2.0			Total time, min	1.8			Total time, min	1.7		
1	2	Loaded	823	8	2	Loaded	871	15	2	Loaded	847	15	2	Loaded	851
2		15.1	765	9		12.1	832	16		21.4	784	16		15.4	829
3		18.4	765	10		15.3	844	17		15.0	756	17		15.8	808
4		16.6	801	11		40.4	829	18		15.5	798	18		14.9	811
5		20.2	791	12		20.0	863	19		19.1	794	19		16.7	759
6		20.0	783	13		20.4	847	20		12.9	832	20		20.6	768
7		16.1	825	14		16.2	891	21		13.2	832	21		16.4	825
Average		17.8	793	Average		20.7	854	Average		16.2	806	Average		16.7	807
Total time, min	1.9			Total time, min	2.2			Total time, min	1.8			Total time, min	1.8		
1	3	Loaded	851	8	3	Loaded	863	15	3	Loaded	822	15	3	Loaded	857
2		37.7	788	9		18.0	815	16		14.8	794	16		14.0	818
3		33.0	741	10		17.9	832	17		20.4	768	17		18.2	808
4		16.4	794	11		16.8	840	18		16.1	791	18		14.1	823
5		18.0	808	12		18.0	829	19		18.2	792	19		13.5	804
6		14.1	788	13		15.1	829	20		18.8	806	[b]20		15.0	820
7		14.8	788	14		16.1	867	21		15.2	822	21		-	-
Average		22.3	794	Average		17.0	839	Average		17.2	799	Average		14.9	822
Total time, min	2.4			Total time, min	1.9			Total time, min	1.9			Total time, min	1.4		

[a]Time includes 5-second stoppage clearance time during 5th magazine.
[b]Failure to extract on last round.

Table I-X. Cyclic Rate of Fire and Magazine Change Times, Pleiku Dust

Weapon No. 1				Weapon No. 2				Weapon No. 6				Weapon No. 7			
Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min
1	1	Loaded	765	8	1	Loaded	820	15	1	Loaded	786	15	1	Loaded	836
2		16.1	775	9		15.9	847	16		19.3	825	16		12.4	859
3		14.2	788	10		17.4	863	17		12.0	844	17		10.8	871
4		13.4	791	11		16.9	855	18		16.0	853	18		11.3	871
5		12.0	783	12		12.0	865	19		11.0	871	19		9.6	881
6		10.0	808	13		14.1	844	20		10.6	883	20		12.0	879
7		8.2	831	14		21.1	867	21		12.6	891	21		9.8	883
Average		12.3	792	Average		16.2	852	Average		13.6	850	Average		11.0	869
Total time, min	1.4			Total time, min	1.8			Total time, min	1.5			Total time, min	1.2		
1	2	Loaded	859	8	2	Loaded	865	15	2	Loaded	838	15	2	Loaded	883
2		19.6	863	9		16.9	877	16		17.3	869	16		22.7	893
3		23.4	867	10		21.9	891	17		18.4	869	17		14.6	904
4		18.3	881	11		18.8	895	18		18.8	885	18		14.4	921
5		36.3	873	12		17.1	910	19		12.0	897	19		14.4	917
6		14.5	883	13		14.9	921	20		13.2	904	20		12.8	921
7		17.0	895	14		14.6	917	21		13.8	904	21		13.9	919
Average		21.5	874	Average		17.4	897	Average		15.6	881	Average		15.5	908
Total time, min	2.3			Total time, min	1.9			Total time, min	1.7			Total time, min	1.7		
1	3	Loaded	818	8	3	Loaded	883	15	3	Loaded	885	15	3	Loaded	871
2		16.2	847	9		20.2	895	16		16.5	904	16		17.1	887
3		16.9	847	10		21.8	895	17		18.4	912	17		20.3	908
4		18.7	851	11		14.9	902	18		20.2	908	18		[a]68.5	[a]904
5		14.9	861	12		23.9	900	19		11.6	917	19		-	-
6		13.7	881	13		11.4	906	20		14.4	915	20		-	-
7		12.6	893	14		18.3	908	21		14.1	921	21		-	-
Average		15.5	857	Average		18.4	898	Average		15.9	909	Average		18.7	889
Total time, min	1.7			Total time, min	2.0			Total time, min	1.7			Total time, min	[b]0.8		

[a]Not included in average or total; test was stopped.
[b]Estimated time because of weapon stoppage.

Table I-XI. Cyclic Rate of Fire and Magazine Change Times, Lai-Khe Dust

Weapon No. 1				Weapon No. 2				Weapon No. 6				Weapon No. 7			
Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min
1	1	Loaded	815	8	1	Loaded	859	15	1	Loaded	844	15	1	Loaded	849
2		12.7	838	9		19.4	871	16		17.3	859	16		23.4	875
3		10.6	853	10		17.3	900	17		15.1	883	17		17.2	879
4		11.9	855	11		14.3	904	18		15.0	891	18		21.8	891
5		8.8	863	12		12.0	908	19		12.5	883	18		15.6	885
6		7.7	863	13		13.5	908	20		16.4	900	20		17.6	883
7		7.7	879	14		13.5	912	21		14.4	891	21		15.9	891
Average		9.9	852	Average		15.0	895	Average		15.1	879	Average		18.6	879
Total time, min	1.2			Total time, min	1.7			Total time, min	1.7			Total time, min	1.7		
1	2	Loaded	857	8	2	Loaded	871	15	2	Loaded	857	15	2	Loaded	891
2		24.9	840	9		10.9	883	16		15.5	832	16		16.0	887
3		17.1	851	10		15.4	885	17		29.8	818	17		19.0	877
4		16.8	861	11		15.2	887	18		16.0	840	18		16.7	871
5		15.0	863	12		23.7	887	19		18.1	853	19		19.2	879
6		17.3	859	13		20.6	897	20		16.9	859	20		18.7	883
7		16.6	867	14		19.4	910	21		44.6	783	21		18.9	893
Average		17.9	857	Average		17.5	889	Average		23.5	835	Average		18.1	883
Total time, min	1.9			Total time, min	1.9			Total time, min	2.5			Total time, min	2.0		
1	3	Loaded	859	8	3	Loaded	865	15	3	Loaded	857	15	3	Loaded	851
2		17.4	859	9		23.8	840	16		17.6	818	16		15.9	844
3		26.1	869	10		20.2	867	17		24.2	829	17		23.5	838
4		21.2	867	11		24.6	867	18		21.8	863	18		24.3	849
5		16.7	867	12		29.3	877	19		21.9	879	19		19.5	853
6		17.7	877	13		16.5	377	20		24.8	857	20		19.3	857
7		15.5	887	14		20.3	900	21		19.3	857	21		19.9	857
Average		19.1	869	Average		22.5	870	Average		21.6	851	Average		20.4	850
Total time, min	2.1			Total time, min	2.4			Total time, min	2.3			Total time, min	2.2		

Table I-XII. Cyclic Rate of Fire and Magazine Change Times, Cam Ranh-Bay Dust

Weapon No. 1				Weapon No. 2				Weapon No. 6				Weapon No. 7			
Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/mi	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time sec	Cyclic Rate, rd/min
1	1	Loaded	747	8	1	Loaded	792	15	1	Loaded	791	15	1	Loaded	808
2		19.8	747	9		24.0	808	16		23.7	838	16		23.7	840
3		24.6	755	10		21.6	825	17		21.1	855	17		20.5	857
4		25.5	768	11		23.4	825	18		20.4	857	18		19.9	859
5		23.6	775	12		22.5	840	19		20.6	863	19		19.3	863
6		26.3	788	13		20.6	844	20		20.1	863	20		19.7	863
7		24.8	789	14		20.5	855	21		20.7	871	21		21.5	844
Average		24.1	767	Average		22.1	827	Average		21.1	848	Average		20.8	848
Total time, min	2.6			Total time, min	2.4			Total time, min	2.3			Total time, min	2.2		
1	2	Loaded	836	8	2	Loaded	883	15	2	Loaded	883	15	2	Loaded	897
2		23.0	859	9		20.1	879	16		20.4	904	16		18.0	917
3		19.6	871	10		20.4	887	17		22.2	900	17		19.3	919
4		20.2	887	11		20.4	879	18		20.6	904	18		19.1	904
5		19.2	887	12		19.2	887	19		22.9	900	19		19.3	900
6		19.4	900	13		19.1	883	20		19.3	908	20		23.5	900
7		18.4	900	14		20.0	877	21		19.5	912	21		21.0	895
Average		20.0	877	Average		19.9	882	Average		20.8	902	Average		20.0	905
Total time, min	2.1			Total time, min	2.2			Total time, min	2.2			Total time, min	2.2		
1	3	Loaded	871	8	3	Loaded	893	15	3	Loaded	863	15	[a]3	Loaded	881
2		21.3	853	9		26.4	910	16		26.5	885	16		16.8	883
3		21.1	863	10		20.5	904	17		23.5	867	17		18.2	887
4		19.0	869	11		21.0	910	18		24.4	877	18		-	-
5		18.9	891	12		20.7	924	19		21.0	879	19		-	-
6		20.7	897	13		21.7	897	20		22.0	883	20		-	-
7		20.3	881	14		26.4	908	21		21.2	867	21		-	-
Average		20.2	875	Average		22.8	907	Average		23.1	874	Average		-	-
Total time, min	2.2			Total time, min	2.4			Total time, min	2.5			Total time, min	2.1		

[a]Timer-recorder tape break prevented recording last four times and rates. Total time taken with a stop watch.

Table I-XIII. Cyclic Rate of Fire and Magazine Change Times, Silica Flour Dust

Weapon No. 1				Weapon No. 2				Weapon No. 6				Weapon No. 7			
Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time, sec	Cyclic Rate, rd/min	Magazine No.	Trial No.	Loading Time sec	Cyclic Rate, rd/min
1	1	Loaded	788	8	1	Loaded	811	15	[b]1	Loaded	773	15	1	Loaded	823
2		22.3	685	9		21.6	753	16		22.6	-	16		20.1	743
3		22.7	675	10		23.6	770	17		-	-	17		20.3	759
4		20.8	689	11		23.1	770	18		-	-	18		23.6	770
5		22.4	693	12		23.6	799	19		-	-	19		23.1	768
6		22.8	689	13		21.2	808	20		-	-	20		26.1	778
7		24.5	692	14		22.9	788	21		-	-	21		22.6	791
Average		22.6	702	Average		22.7	786	Average		-	-	Average		22.6	776
Total time, min	[a]2.5			Total time, min	2.4			Total time, min	0.4			Total time, min	2.4		

[a]Includes 4-second delay for stoppage clearance during firing of last magazine.
[b]Failure to extract (FX) on first round fried from second magazine. Stoppage not clearable by immediate action.

FUNCTION AND DURABILITY TEST DATA (CYCLIC RATE AND MALFUNCTIONS)

During evaluation of weapon-performance data it became apparent that the three weapons characteristically exhibited patterns of cyclic rate performance as follows:

a. The lowest average cyclic rate (20 rounds) in each 100-round cycle occurs with the first 20 rounds and thereafter the rate increases for each additional 20 rounds fired in the cycle. Figures I-2 through I-4 illustrate this characteristic. Indications are that the rifle operates more efficiently as it is heated by firing, at least within the 100-round cycles fired in this test. The malfunction rate data in Table 1.4-IV bear out this indication.

b. In nearly all instances, the average cyclic rate of the first 20-round burst fired after weapon maintenance (at 1000-round intervals) is higher than that of the last previous 20-round burst fired before maintenance (Figures I-5 through I-7). An accumulation of fouling in the mechanism in 1000 rounds of firing apparently causes this phenomenon, since cleaning tends to restore the rate.

c. The average cyclic rate, in 1000-round increments, tends to progressively decrease during the first 6000 to 8000 rounds fired. Thereafter, the average rates increase until testing is terminated at 10,000 rounds. Figures I-2 through I-7 illustrate this characteristic. The number and type of malfunctions are also given. The greatest preponderence of all malfunctions occurs between 5000 and 7000 rounds. A relationship between cyclic rate reduction and type I malfunctions is indicated; however, this relationship is not encountered with type II malfunctions since most occur outside the 5000- to 7000-round area. The cause of progressive cyclic rate decrease with subsequent increase has not been determined.

10,000-Rd. Function and Durability Test. Malfunctions by Type and Mode of Fire (i.e. Semiautomatic= S, 3-To 5-Rd. Automatic Burst=B, 20-Rd. Automatic Burst=A) and Cyclic Rate of Fire by Magazine.

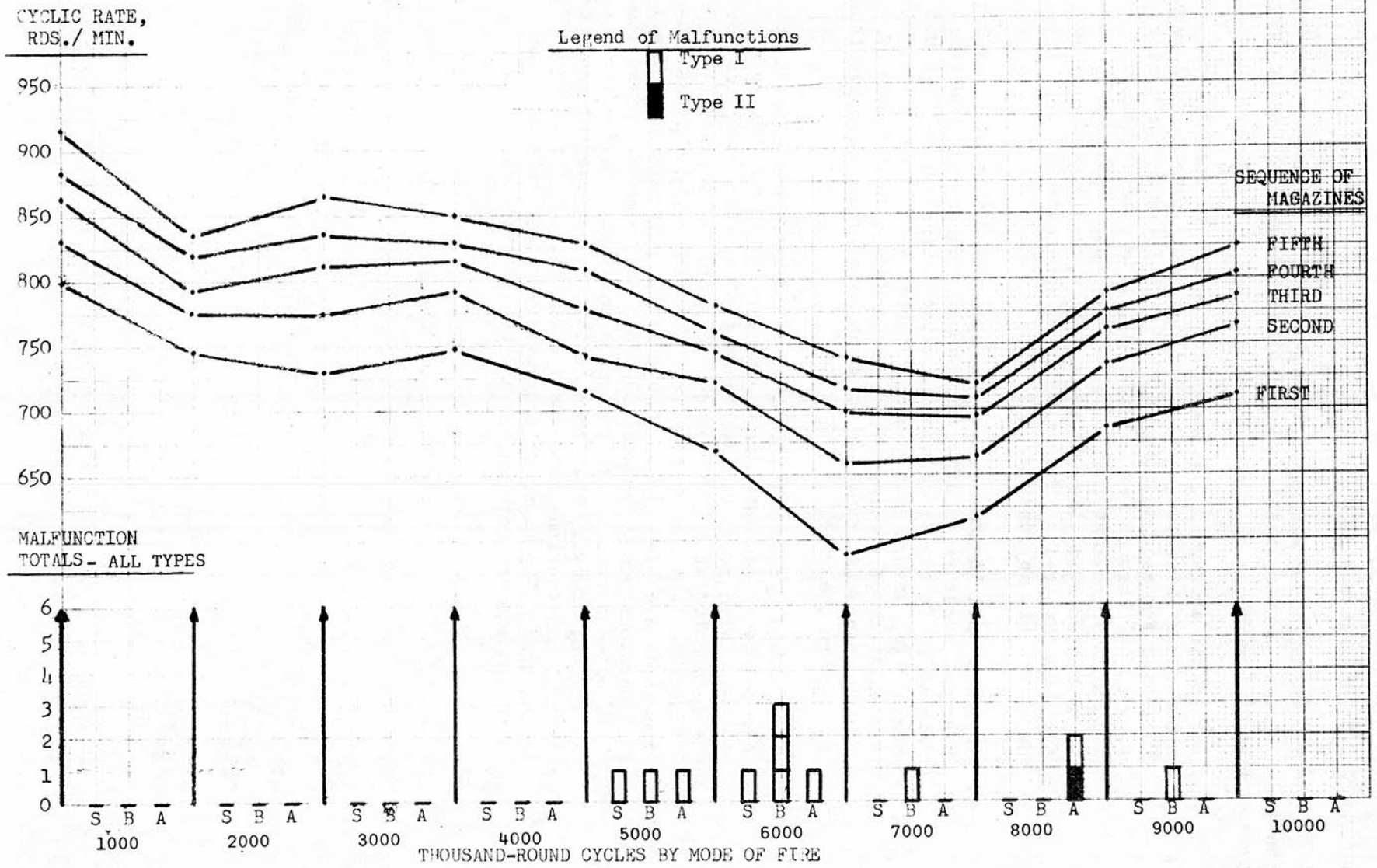


Figure I-2: APG Weapon No. 3, Chrome-Plated Chamber.

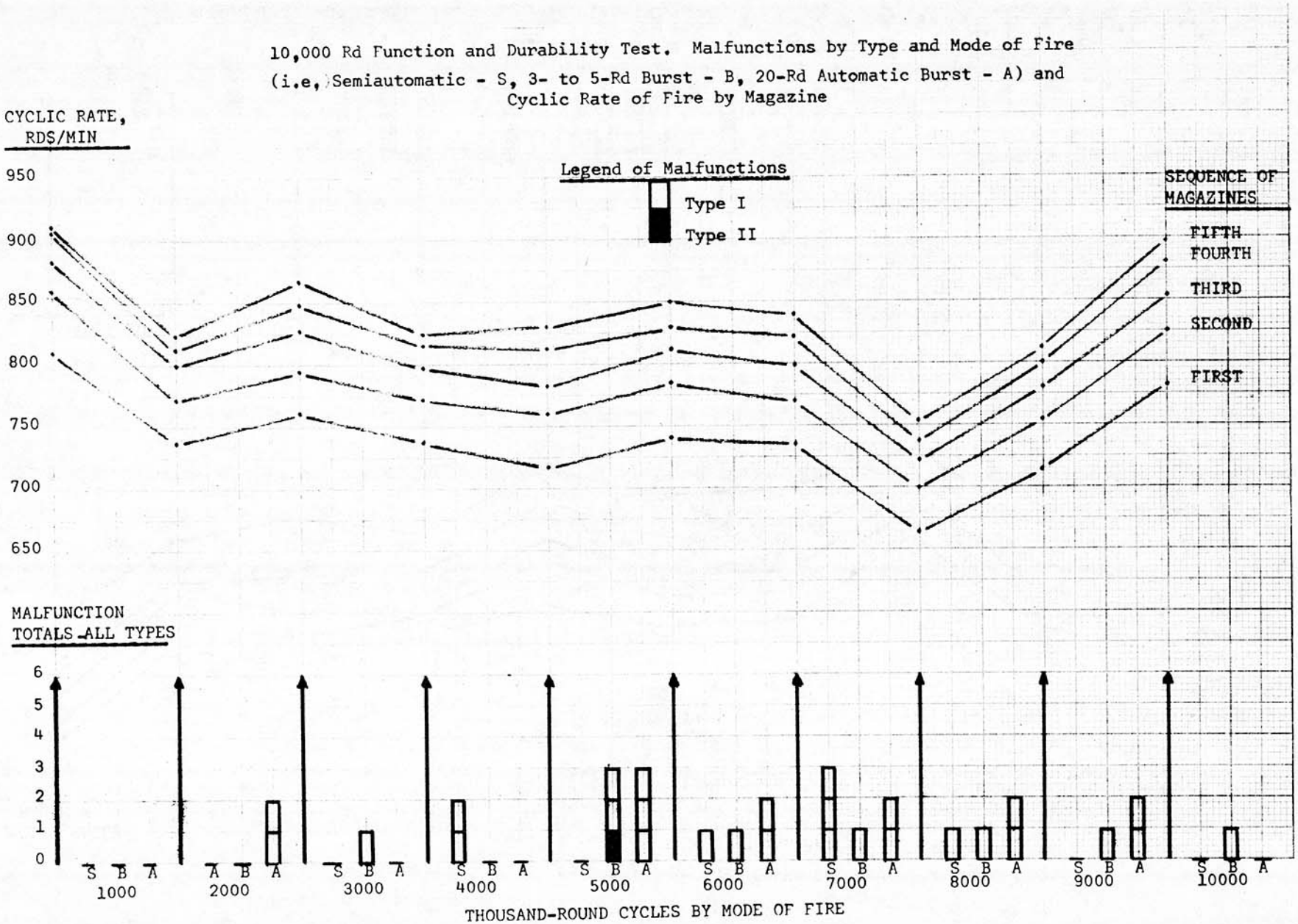


Figure I-3: APG Weapon No. 4, Chrome-Plated Chamber.

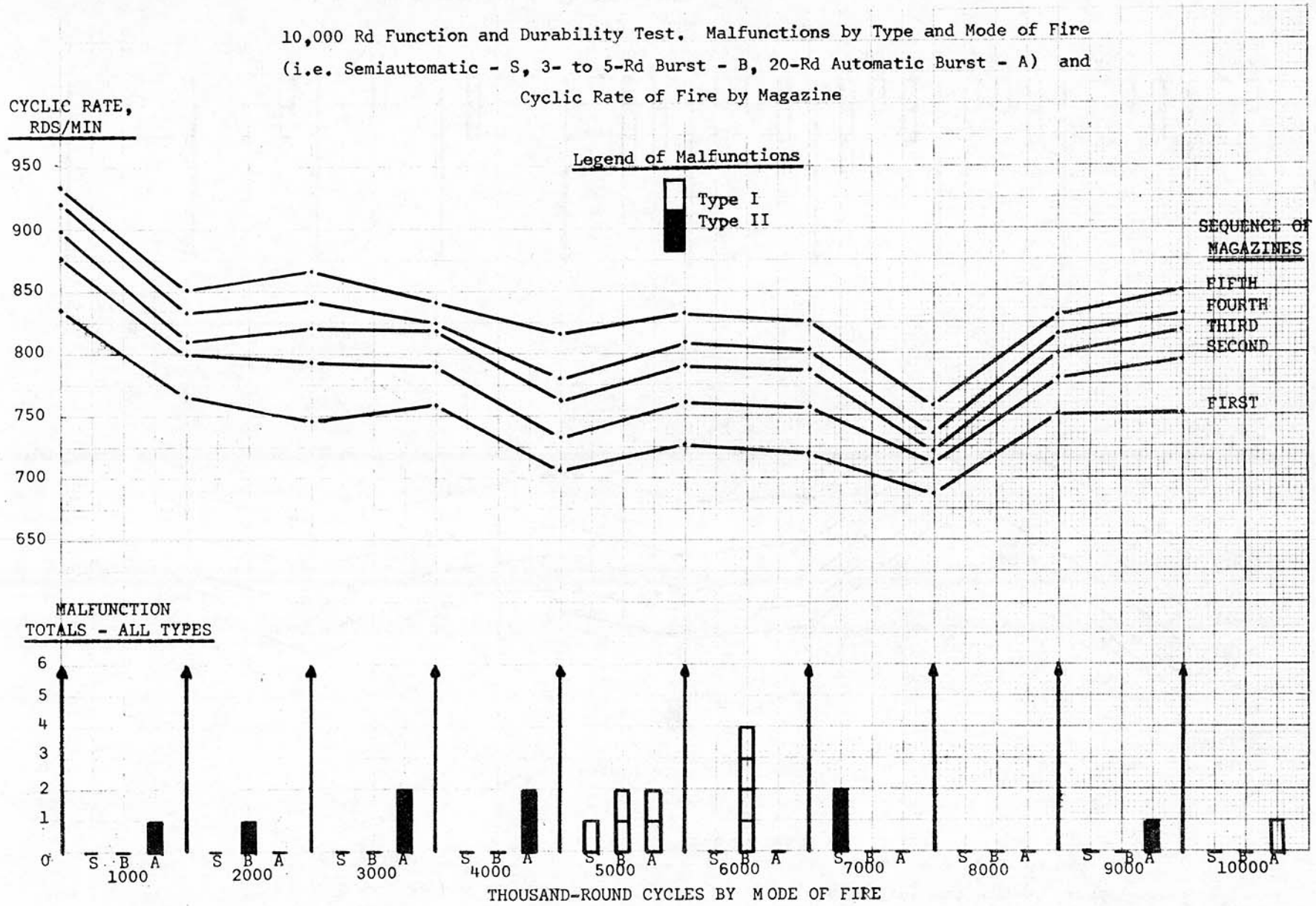


Figure I-4: APG Weapon No. 5, Chrome-Plated Chamber.

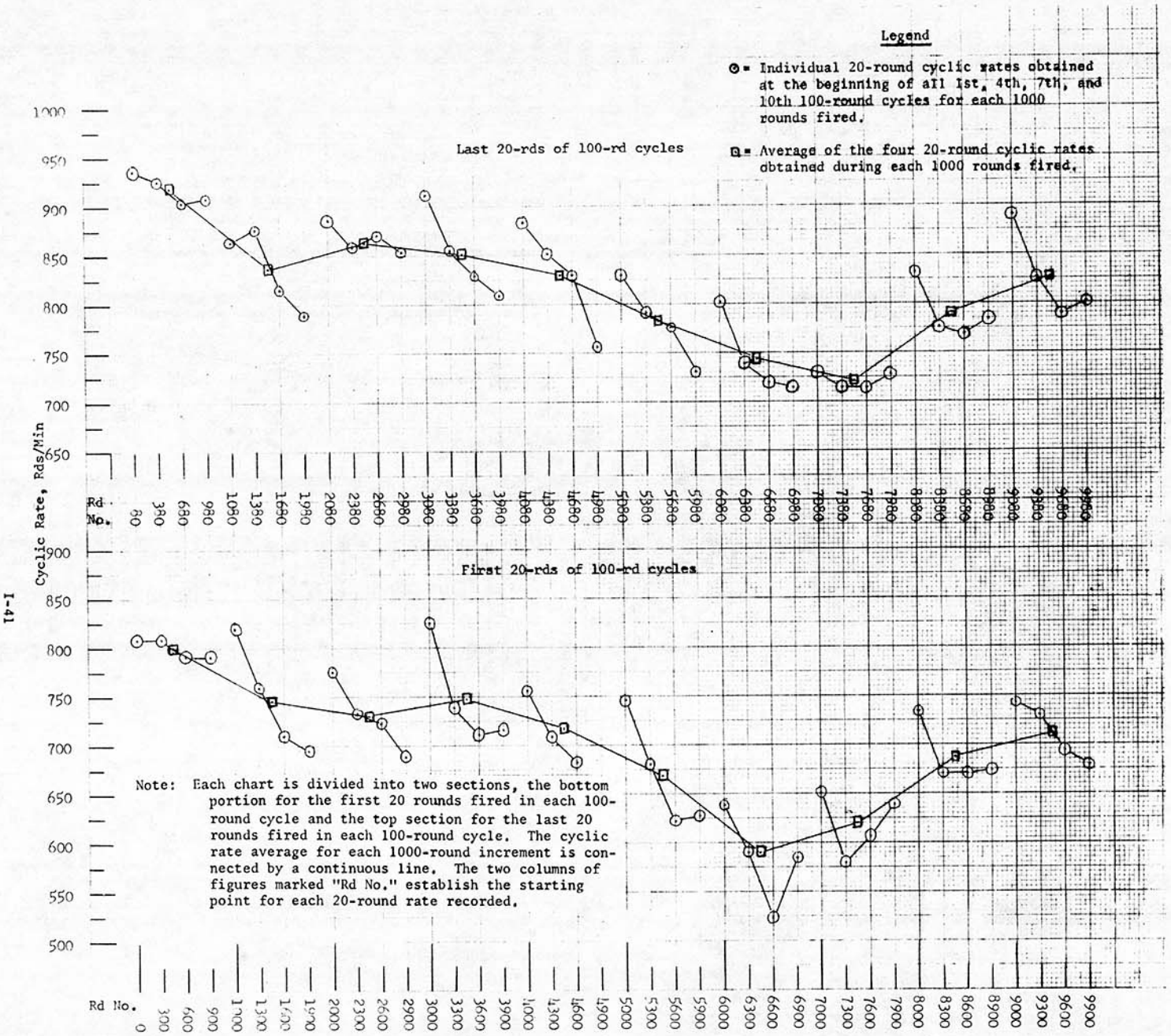


Figure I-5: APG Weapon No. 3.

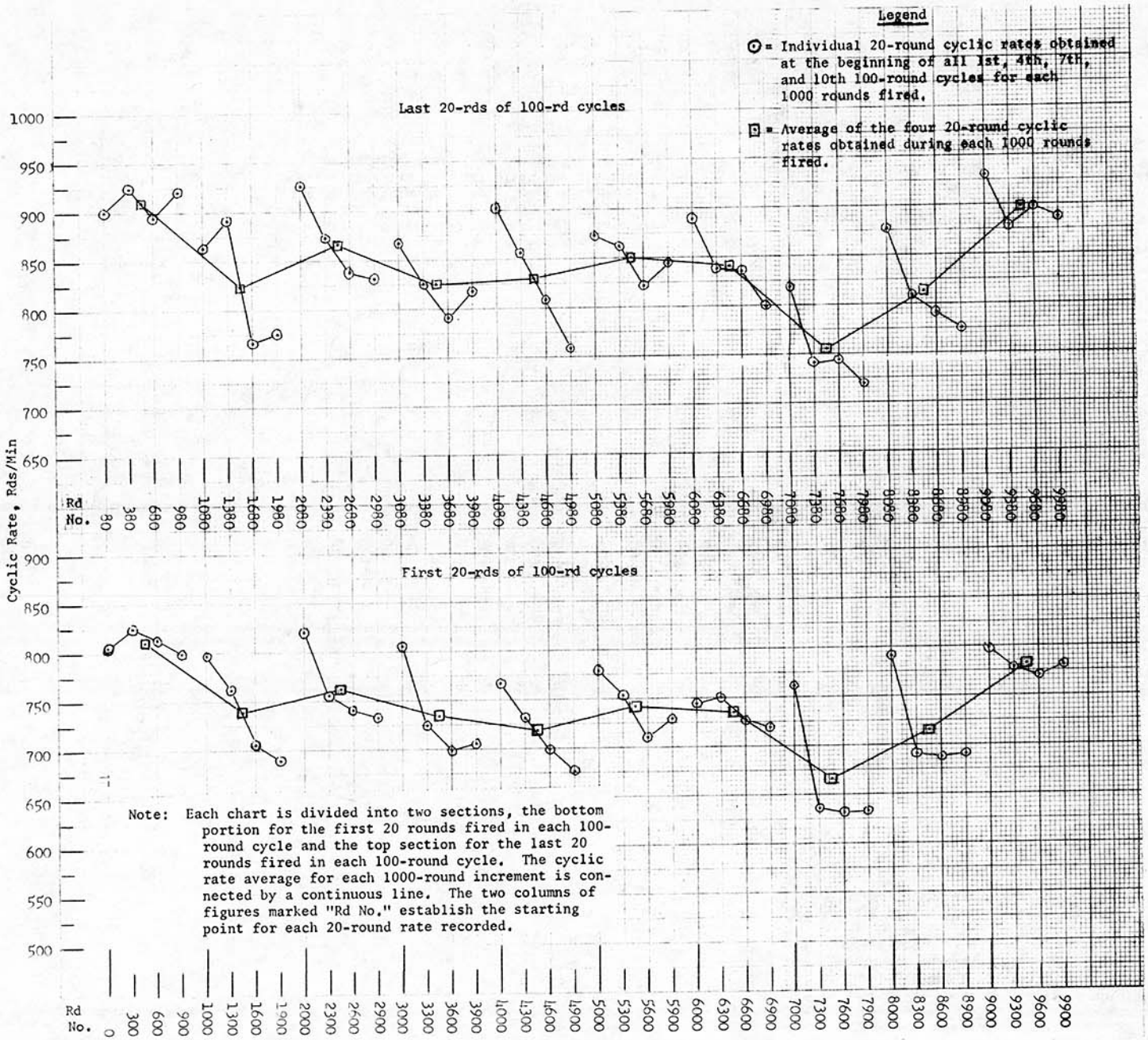
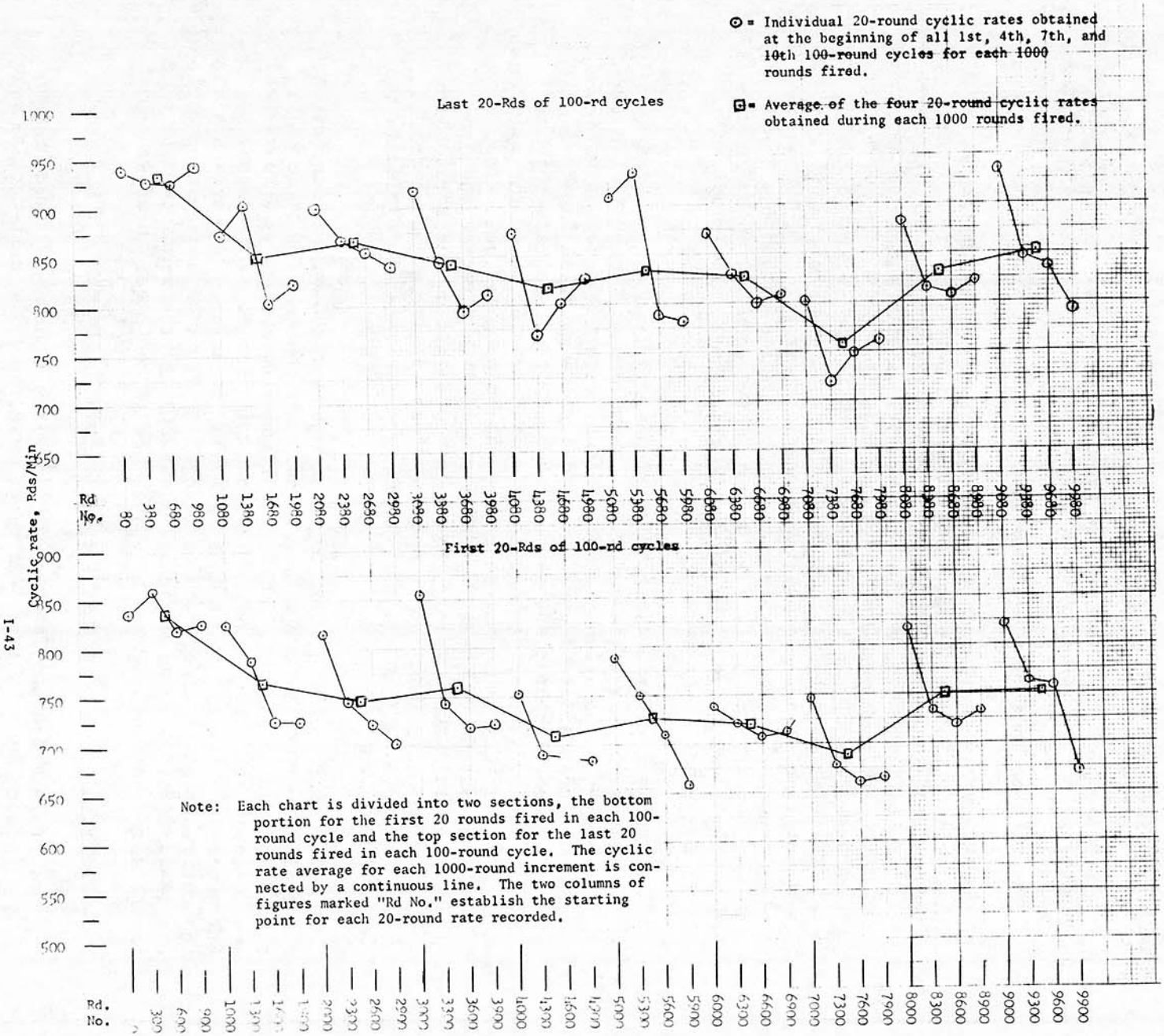


Figure I-6: APG Weapon No. 4.



Note: Each chart is divided into two sections, the bottom portion for the first 20 rounds fired in each 100-round cycle and the top section for the last 20 rounds fired in each 100-round cycle. The cyclic rate average for each 1000-round increment is connected by a continuous line. The two columns of figures marked "Rd No." establish the starting point for each 20-round rate recorded.

Figure I-7: APG Weapon No. 5.

CARTRIDGE STRIPPING TEST

The purpose of this test was to determine the difference, if any, of cartridge-stripping characteristics of 18- and 20-round-loaded magazines.

The test methods were as follows:

a. Remove the buttstock and lower receiver extension from an M16A1 rifle. Load a 20-round magazine with twenty M193 ball cartridges (lot TW-18125). Insert the magazine into the weapon. Contact the head of the first cartridge with the bolt. Use a calibrated push-pull gage and manually apply force with the gage directly to the bolt carrier until the cartridge has been completely stripped from the magazine. Record the resultant force. Remove the magazine and reposition the next round to insure complete engagement by the feed lip. Repeat the procedure until all 20 rounds have been stripped from the magazine. Repeat the procedure for a total sample of ten magazines.

b. The next phase consists of stripping cartridges from ten magazines in four different rifles by releasing the bolt from the bolt-stop position. Condition one 20-round-loaded magazine in 140-mesh silica flour dust. Insert the magazine in the first weapon with bolt engaged on the bolt stop. Depress the bolt stop and attempt to strip the first cartridge from the magazine. Eject this round and re-engage the bolt on the bolt stop. Reposition the next round (if required) and repeat the procedure twice. Reload the magazine, condition the first three rounds in dust, and repeat the three trials in the other weapons. Strip all cartridges from the magazine cycled in the last weapon.

Select a different weapon to start the next sequence and repeat the cycle using another magazine. Repeat the sequence twice more for a total of four magazines. Next, condition with dust two 18-round- and two 20-round-loaded magazines. Test one magazine in each weapon. Successively strip all cartridges from each magazine. Do not reposition the cartridge stack after each cartridge. Next, load and dust-condition one 18- and one 20-round magazine. Test-fire in the semiautomatic mode in the first weapon. Repeat this sequence in the other three weapons.

The results of this test are as follows:

a. Figure I-8 and Table I-XIV gives the results of the stripping force test. Table I-XV gives results of the dust-conditioned magazine stripping test. Since the data given in Table I-XIV are not the exact force which would be generated by the release of the bolt from the bolt stop under action-spring load, these data should be used only as an indication of relative stripping forces.

b. From the data obtained, the difference in stripping between 18- and 20-round-loaded magazines does not appear to be significant.

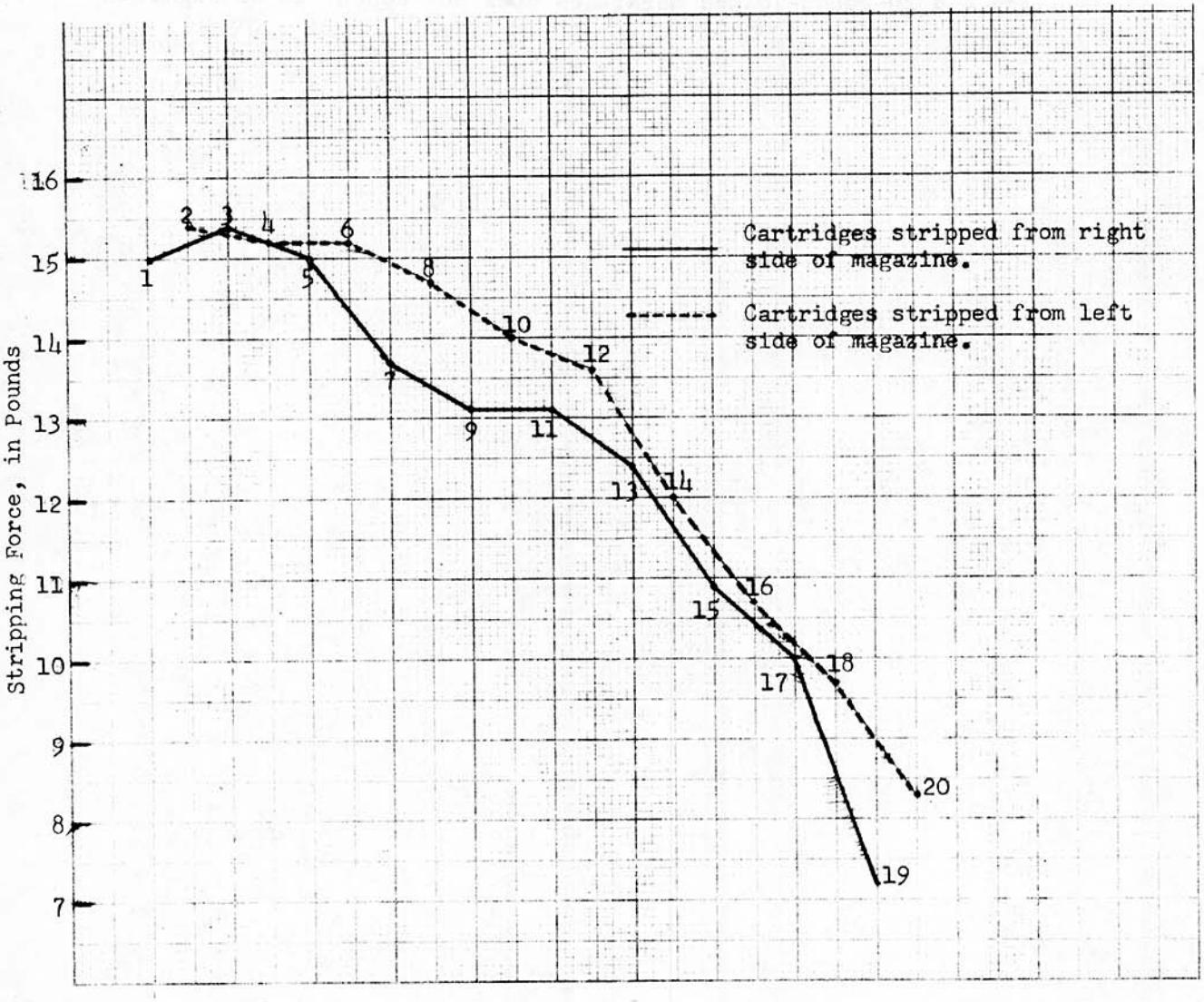


Figure I-8: Stripping Force (Lb) Required to Sequentially Strip 20 Cartridges from Magazine.

Table I-XIV. Applied Force, in Pounds, Required to Manually Strip the Top Cartridge from A 20-Round-Capacity Magazine

Trial No.	Cartridge Number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	15.5	16.0	15.0	15.0	16.0	17.0	15.0	15.5	15.5	14.5	14.5	14.5	15.0	13.5	14.5	12.0	11.0	10.5	7.5	10.0
2	16.5	15.0	18.5	16.5	17.5	16.5	16.0	16.0	13.0	15.5	14.0	14.0	11.5	14.0	12.5	13.0	10.0	12.0	7.0	10.0
3	15.5	16.0	16.0	17.5	14.5	17.0	16.5	17.5	15.0	17.0	16.5	15.5	15.0	14.5	12.5	11.5	11.5	9.5	8.5	9.5
4	15.0	15.5	16.0	15.5	15.5	16.5	15.0	16.0	14.5	15.0	14.0	15.5	15.5	12.5	10.5	11.5	9.0	9.5	6.0	9.0
5	17.5	17.5	18.0	15.0	17.0	15.0	16.0	14.5	15.0	13.0	16.0	13.0	11.0	12.0	10.5	11.5	11.0	9.5	8.0	8.5
6	14.5	15.0	14.5	13.0	14.0	12.0	12.0	13.0	12.0	12.0	11.5	12.5	10.0	10.5	12.0	10.0	10.0	9.5	8.5	7.0
7	15.0	14.5	16.0	15.0	14.5	15.0	12.5	13.0	10.5	13.0	12.0	12.5	10.5	10.0	9.5	9.0	10.5	9.5	7.5	7.5
8	13.5	15.0	14.0	15.0	14.0	14.0	11.5	14.5	12.5	14.0	11.0	12.5	10.0	9.0	7.5	8.0	8.5	6.0	5.0	6.0
9	11.0	14.0	12.5	14.0	14.0	14.0	10.5	13.0	10.5	12.0	10.0	13.0	11.5	11.5	9.5	10.5	10.0	12.5	8.0	8.0
10	16.0	15.0	13.5	15.0	13.5	15.0	12.0	14.0	12.5	14.0	11.5	13.0	14.0	12.0	10.0	10.0	8.5	8.5	6.5	7.5
Mean	15.0	15.4	15.4	15.2	15.0	15.2	13.7	14.7	13.1	14.0	13.1	13.6	12.4	12.0	10.9	10.7	10.0	9.7	7.2	8.3

Table I-XV. Cartridge Stripping Characteristics of Dust-Conditioned Magazines

Weapon No.	Magazine No.	Previous Trials on Magazines	Round Numbers 1	2	3	Remarks
			Part a			
1	1	0	FS	-	-	
	3	3	FS	FS	FS	Failure to strip (FS) occurred through round 9. Rounds 19 and 20 were double-fed.
	6	1	FS	FS	FS	
	9	2	Stub	Stub	Stub	Stub condition in all weapons caused by worn feed lips.
2	1	1	FS	FS	FS	
	3	2	FS	FS	FS	
	6	0	FS	FS	FS	
	9	3	Stub	Stub	Stub	Rounds 4 and 5 were stub; rounds 6 through 9 were FS and rounds 19 and 20 were double-fed.
6	1	2	FS	FS	FS	
	3	1	FS	FS	FS	
	6	3	FS	FS	FS	Rounds 4 through 9 were FS, rounds 15 and 16, 19 and 20 were double-fed.
	9	0	Stub	Stub	Stub	
7	1	3	FS		FS	Rounds 4 through 9 were FS; rounds 19 and 20 were double-fed.
	3	0	FS	FC	FS	
	6	2	FS	FS	FS	
	9	1	Stub	FS	FS	
			Part b			
1	11	0	FS	FS	FS	Rounds 4 through 6 were FS.
2	15	0		(18-rd loading)	FS	Rounds 4 through 9 were FS; rounds 10 through 18 were BOB; rounds 19 and 20 were double-fed.
6	14	0	FS	FS	FS	Rounds 4 through 9 were FS.
7	17	0		(18-rd loading)	FS	

Table I-XV (Cont'd)

Weapon No.	Magazine No.	Previous Trials on Magazines	Round Numbers 1	2	3	Remarks
				Part c		
1	18	2		(18-rd loading)	FS	Rounds 5, 7 through 12 were FS; round 17 was FC; rounds 19 and 20 were double-fed.
	20	2	FS	FS		Rounds 4 through 6 were FS.
2	18	3	FS			
	20	3		(18-rd loading)	FS	Round 5 was FS.
6	18	1				No malfunctions.
	20	1		(18-rd loading)		No malfunctions.
7	18	0		(18-rd loading)	FS	Round 5 was FS.
	20	0	FS			

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

S - 9 Nov 67
18 Dec 67

AMSTE-BC

31 OCT 1967

SUBJECT: Test Directive for Initial Production Test (IPT) of Chrome Plated Chambers for M16A1 Rifle, USATECOM Project No. 8-8-0200-07

TO: Commanding Officer
Aberdeen Proving Ground
ATTN: STEAP-CO-P
Aberdeen Proving Ground, Md 21005

1. Reference:

a. USATECOM Project No. 8-7-0230-03.

b. Message, AMCPM-RS 28506, dated 131600Z Oct 67, subject: IPT M16A1 Rifles w/Chrome Plated Chambers, Inclosure 1.

c. Planning Meeting held at USATECOM on 24 Oct 67 at the request of Project Manager, Rifles to discuss test programs for M16A1 Rifle and Associated Ammunition.

2. M16A1 Rifles are being produced with chrome plated chambers. Referenced message states that ten weapons will be made available for an IPT test. It is requested that CO, APG prepare test plan, execute and publish final report for subject test.

3. The objectives of the IPT are:

a. Evaluate the degree of improvement in weapon performance under ambient, extreme temperature and adverse environments in direct comparison with unplated weapon chambers.

b. Determine suitability for field issue in accordance with AMCR 700-34.

4. In reference 1a, an approved Quality Assurance (QA) Test Plan has been forwarded your agency. According to present plans five weapons are to be used for the QA test and five for the IPT. It is suggested that all test weapons be utilized to the best advantage without jeopardizing the QA requirement. All pertinent data from the QA test may be utilized to satisfy test requirements for the IPT.

AMSTE-BC 31 OCT 1967

SUBJECT: Test Directive for Initial Production Test (IPT) of Chrome Plated Chambers for M16A1 Rifle, USATECOM Project No. 8-8-0200-07

5. In reviewing the comprehensive evaluation of the M16A1 Rifle in the lubricants test, Report No. DPS 2417, the necessity for tests in addition to the QA tests in all adverse areas does not appear warranted. This rationale is based on the relatively low malfunction rates noted in certain phases using the MIL-L-46000A lubricant. To provide discriminating data by which to evaluate the degree of improvement with regard to the chrome plated chambers, special tests should be imposed to indicate the potential advantages of chrome plating, i.e., corrosion, maintenance, extraction under levels of fouling or contamination wherein non-plated chambers would not be expected to perform as well. Test plan should be prepared with sufficient flexibility to permit deviation to cover unusual conditions which may arise.

6. As agreed at referenced meeting, the chrome plated chamber test will be initiated immediately. Use of QA funds was authorized by AMCPM-RS. Funds will be replenished upon your request. Control weapons without plated chambers should be utilized. In addition to the QA requirement, the following tests are to be considered:

a. Measurements of the chrome plated chamber and bores on all weapons at beginning and end of test.

b. Dynamic dust test to include the three samples of dust from Vietnam, at varying rates and amounts of dust, i.e., one-half pound, two pounds per minute.

c. A separate dust test in an attempt to discriminate potential advantages of chrome plating when contamination of the chamber is introduced. For this purpose, it is suggested that dust contaminated magazines be utilized. Initially, the weapons should be clean and lubricated. During the test, no further lubrication should be imposed in an attempt to obtain discriminating data. Suggest the test be limited to approximately 3,000 rounds in the event that comparable functioning of the control and test weapons occurs.

d. Endurance test of 10,000 rounds using a minimum of three weapons with frequent inspections and specific measurements of chamber and bore at 6,000 rounds, 8,000 rounds and 10,000 rounds.

e. Salt water immersion tests using standard procedures as guidelines. Frequent submersions of weapon may be necessary to accelerate corrosion by which discriminating data may be obtained. Submerge ammunition if deemed necessary.

AMSTE-BC 1 OCT 1967

SUBJECT: Test Directive for Initial Production Test (IPT) of Chrome Plated Chambers for M16A1 Rifle, USATECOM Project No. 8-8-0200-07

7. Two separate reports are desired. One for the QA test and one for the IPT. It is requested that malfunction data for both reports be summarized to include the following:

a. Those that occurred during semiautomatic and automatic fire.

b. Malfunctions (Type I) that are immediately correctable and those (Type II) that require disassembly and/or the use of tools.

c. Those that occur up to 6,000 rounds and those that occur during the next 4,000 rounds of the endurance test.

8. It is reemphasized that current procedures relative to firing and adverse exposure may have to be modified to completely exploit and evaluate the degree of advantage or disadvantage achieved by chrome plated chambers.

9. This is a SEA related, Category I, USATECOM Priority 1 test. USATECOM Project No. 8-8-0200-07 is assigned.

10. Unclassified letter test plan and report are acceptable. Submission of test plan is desired by 9 November 1967. Test report is required by this headquarters by 18 December 1967.

11. Distribute test plan and report as outlined in Inclosure 2.

FOR THE COMMANDER:

GOODWIN MORROW
Act Dir
Inf Mat Test Dir

3 Incl w/d
1. Msg, AMCPM-RS
2. Dist List
3. STE Form 1027

Copies furnished: (w/o incl)
CG USAMC ATTN: AMCPM-RS
USACDC LO, USATECOM
USMC LO, USATECOM
CO APG ATTN: STEAP-DS-TI
(Mr Doilney)

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY TEST AND EVALUATION COMMAND
ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-BC

12 JAN 1968

SUBJECT: Initial Production Test of Chrome Plated Chambers for M16A1, Rifles, USATECOM Project No. 8-8-0200-07

12 JAN. 68

ACTION: D&PS
Info : ISD
SAFETY
CO

TO: Commanding Officer
Aberdeen Proving Ground
ATTN: STEAP-DS-TI
Aberdeen Proving Ground, Md 21005

1. References:

a. Meeting, USATECOM, 10 Jan 68, Subject: M16A1 Test Programs.

b. Message, AMCPM-RS, RI 812, dated 092100Z Jan 68, Subject: M16/M16A1 Rifle, inclosed.

2. As discussed in referenced meeting and confirmed by message, request CO, APG conduct a limited test to evaluate the relative frequency of malfunctions consisting of failure to strip the first round from the magazine when loaded with 20 rounds as compared to magazines loaded with 18 rounds and the conditions if any, when decreased loading is advantageous. It is emphasized that only a gross and preliminary indication is desired. It is suggested that the test be restricted to non-firing exercises to include adverse exposures i.e. dust, most conducive to the occurrence of this malfunction.

3. Due to the urgency associated with all phases of the M16 tests, preliminary results will be provided this office upon completion of tests. The results are to be included in the final report of the chrome plated chamber test.

4. The review of past firings as requested in ref 1b has been initiated by this headquarters.

FOR THE COMMANDER:

Robert B Tully

ROBERT B. TULLY
Colonel, GS
Dir, Inf Mat Test Dir

1 Incl
as

COPY/bm

1968 JAN

RTTUZYUW RUCIRRA0812 Ø1Ø1627-UUUU--RUEOEAA.

ZNR UUUUU

R Ø921ØØZ JAN 68

FM PROJ MGR RIFLES USAMC ROCK ISLAND ILL

TO RUEOEAA/CGUSATECOM APG ABERDEEN MD

INFO RUEOBHA/CGUSAMC

BT

UNCLAS RI 812 FROM AMCPM-RS COL ISAACS FOR AMSTE-BC MR. MORROW; INFO FOR AMCPMSO-RS LTC SQUIRES

SUBJECT CLN M16/M16A1 RIFLE

1. REPORTS CONTINUE TO BE RECEIVED FROM THE FIELD ALLEGING FAILURE-TO-FEED MALFUNCTIONS WITH THE M16/M16A1 RIFLE WHEN MORE THAN 18 ROUNDS ARE LOADED IN THE MAGAZINE.

2. GENERAL BESSON HAS REQUESTED QUOTE STATISTICAL DATA ON RELATION OF FAILURES-TO-FEED TO NUMBER OF ROUNDS IN THE MAGAZINE UNQUOTE.

3. REQUEST YOUR COMMAND CONDUCT A REVIEW OF AVAILABLE FIRING RECORDS FROM PREVIOUS TESTS, SUPPLEMENTED BY ADDITIONAL TESTING YOU CONSIDER NECESSARY, TO ESTABLISH FREQUENCY OF THIS MALFUNCTION AS A FUNCTION OF ROUNDS REMAINING IN THE MAGAZINE. A SUMMARY SUITABLE FOR RESPONDING TO THE REQUEST FROM THE CG, AMC IS REQUIRED.

4. REQUEST YOU ADVISE THIS OFFICE EARLIEST DATE AT WHICH THIS STUDY CAN BE COMPLETED.

Incl 1

APPENDIX III - REFERENCES

1. TECP 700-700, Interim Pamphlet 20-20.

2. Springfield Armory Purchase Description 263B.

APPENDIX IV - DISTRIBUTION LIST

USATECOM Project No. 8-8-0200-07

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AD _____ Accession No. _____

Development and Proof Services, Aberdeen Proving Ground, Maryland
Final Report on USATECOM Project No. 8-8-0200-07, Initial Production Test of Chrome-Plated Chambers for 5.56-mm, M16A1 Rifles, February 1968
AMCMS Code No. 4420.25.0132.127, Report No. DPS-2675
Author Franklin H. Miller
Secondary distribution controlled by Project Manager, Rifles, AMCPM-RS
122 pages, 32 illustrations

Unclassified Report

Five M16A1 rifles equipped with chrome-plated chambers underwent an initial production test at Aberdeen Proving Ground, Maryland, from 8 November 1967 through 17 January 1968. The purpose of this evaluation was to determine plating durability and effects of the chrome-plated chambers upon weapon performance under adverse conditions. Static and dynamic dust tests, salt water immersion with storage at high temperature and humidity, and 10,000-round function and durability tests were performed. Performance of the plated chambers was superior to that of nonplated chambers in adverse conditions tests and satisfactorily withstood the 10,000-round durability test.

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DOCUMENT CONTROL DATA - R&D

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1. ORIGINATING ACTIVITY *(Corporate author)*

Development and Proof Services
Aberdeen Proving Ground, Maryland 21005

2a. REPORT SECURITY CLASSIFICATION

Unclassified

2b. GROUP

3. REPORT TITLE

INITIAL PRODUCTION TEST OF CHROME-PLATED CHAMBERS FOR 5.56-MM, M16A1 RIFLES

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Final Report 8 November 1967 to 17 January 1968

5. AUTHOR(S) *(Last name, first name, initial)*

Miller, Franklin H.

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None

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Project Manager, Rifles, ATTN: AMCPM-RS.

13. ABSTRACT

Five M16A1 rifles equipped with chrome-plated chambers underwent an initial production test at Aberdeen Proving Ground, Maryland, from 8 November 1967 through 17 January 1968. The purpose of this evaluation was to determine plating durability and effects of the chrome-plated chambers upon weapon performance under adverse conditions. Static and dynamic dust tests, salt water immersion with storage at high temperature and humidity, and 10,000-round function and durability tests were performed. Performance of the plated chambers was superior to that of nonplated chambers in adverse conditions tests and satisfactorily withstood the 10,000-round durability test.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Rifle, M16A1 w/chrome plated chamber Initial Production Test of chamber plating						

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