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FINAL REPORT ON

ENGINEER DESIGN TEST

OF

MAGAZINE, 20-ROUND, DISPOSABLE, FOR

M16A1 (XM16E1) RIFLE

BY

FRANKLIN H. MILLER

OCTOBER 1967

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ABSTRACT

Nine different disposable magazine types were tested at Aberdeen Proving Ground, Maryland for the purpose of selecting the type most functionally suitable for use in the M16A1 (XM16E1) rifle. Tests were conducted from 22 March 1967 to 24 August 1967. The various magazines were tested for functional reliability and material durability while being subjected to temperatures of +155°F, 0°F, and -65°F for thermal testing and ambient (+70°F ± 30°F) for function and durability tests. Adverse conditions (sand, mud, and dust), heat and humidity, and chemical compatibility tests were also conducted. The two magazine types selected from the first engineer-design test, and subsequently modified and retested, still exhibit undesirable (although correctable) characteristics which should be ameliorated prior to acceptance of the designs.

FOREWORD

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

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22 MARCH TO 24 AUGUST 1967

SECTION 1. INTRODUCTION

1.1 BACKGROUND

The requirement for design, fabrication, testing, and adoption of a reliable, low-cost magazine for the M16A1 (XM16E1) rifle was predicated on the increased combat attrition of the standard item and its cost.

Headquarters, US Army Materiel Command (USAMC), directed that ENSURE procedures be followed in order to minimize the development time. In order to reduce magazine cost, maximum utilization of nonmetallic components was considered necessary. Several manufacturers of plastic materials were consulted. Code A, Code B, Rock Island Arsenal (RIA), and US Army Limited War Laboratory (LWL) developed and produced sufficient test magazines for an engineer design test (EDT), which started on 22 March 1967 at Aberdeen Proving Ground, Maryland. All magazines entered in the EDT were first-design concepts except the LWL (type 1) product; the laboratory had previously designed, fabricated, and tested a similar nonmetallic magazine.

Testing was conducted in two phases, a first and second EDT. Based upon the test results of the first EDT, two magazine types (RIA and LWL) were submitted for a second EDT after design modifications were made.

1.2 DESCRIPTION OF MATERIEL

Nine different magazine types were submitted for engineer design testing. They comprise a broad spectrum of materials and design concepts.

For ease and uniformity of reference, these magazines have been given numerical type-designations. Magazine types tested in the first EDT are numbered 1 through 7; those tested in the second EDT are numbered 1-A and 5-B.

Figure 1.2-1 depicts the magazine (type 1) submitted by US Army Limited War Laboratory (LWL). The material composition of the follower, floor plate, and body is 30% nylon-filled fiber glass resin. The follower spring is the same as the type used in the standard 20-round metallic magazine. The T slot in the base of the body retains the floor plate. Adhesive bonding prevents movement of the floor plate. The three blind holes on each side of the magazine body are utilized during the manufacturing process. Pins in the mold body index in these holes (and the magazine catch slot) and hold the magazine body during extraction of the mold core.

Figure 1.2-2 depicts the redesigned LWL magazine (type 1-A) submitted for the second EDT. The material composition was changed from 30% to 40% nylon-filled fiber glass. Seven additional blind holes have been added to the left side of the magazine body. This modification was required to reduce the tendency to elongate the magazine catch slot during extraction of the mold core.

The type 5 magazine (Figure 1.2-3) was submitted by Rock Island Arsenal (RIA). The follower and magazine body are manufactured from 20% fiber-glass-filled acetal resin. The unique design features of this magazine is the use of metallic feed lips and magazine body with an integral floor plate. The metal piece which provides the feed lips is formed in the shape of a U with the right and left top portions curved inward to form the lips. The follower and conventional design spring are placed inside the U and this assembly is then inserted into the body of the magazine. Retainer lugs are stamped in the sides of the metallic insert adjacent to openings in the magazine body to prevent misalignment of the components during use.

The redesigned RIA (type 5-B) magazine pictured in Figure 1.2-4 incorporates several modifications. The steel feed-lip material used in the first design, which rusted during the heat and humidity tests, was replaced with stainless steel. The gripping surface of the magazine body was changed by the addition of raised ribs. The over-all weight of the magazine was reduced. Contributing to the weight reduction was the utilization of a skeletonized feed-lip body in some test samples (Figure 1.2-5).

The type 2 magazine, submitted by Code A, is shown in Figure 1.2-6. The material composition of the follower, floor plate, and body is an unfilled polycarbonate. The unique feature of this design is the use of a side-mounted negator-type spring which generates uniform force on the follower at any position within the magazine body. The floor plate is bonded to the magazine body.

The type 4 magazine (Figure 1.2-6) is an additional design submitted by Code A. The only changes made from the type 2 magazine are the use of a conventional-design follower spring, similar to the standard item, and a slanting internal surface on the floor plate.

The third submission of Code A is the type 6 magazine shown in Figure 1.2-6. It is identical to the type 4 magazine in design and materials, except that the beveled floor plate block has been excluded.

One of the Code B submissions is the type 3 magazine pictured in Figure 1.2-7. The material composition of the follower, floor plate, and body is 20% 1/4-inch length, glass-filled polyester. The follower spring is a conventional design similar to the standard 20-round metallic magazine. The floor plate is bonded to the magazine body.

The second submission of Code B is the type 7 magazine (Figure 1.2-7). The material composition of the follower, floor plate, and body is 20% fiber-glass-filled ABS (acryl - butyl - styrate). Types 3 and 7 magazines utilize the same follower spring design. The floor plate is bonded to the magazine body.

Information pertaining to the weapons and ammunition used during the first and second engineer design tests is given in Table 1.2-I.

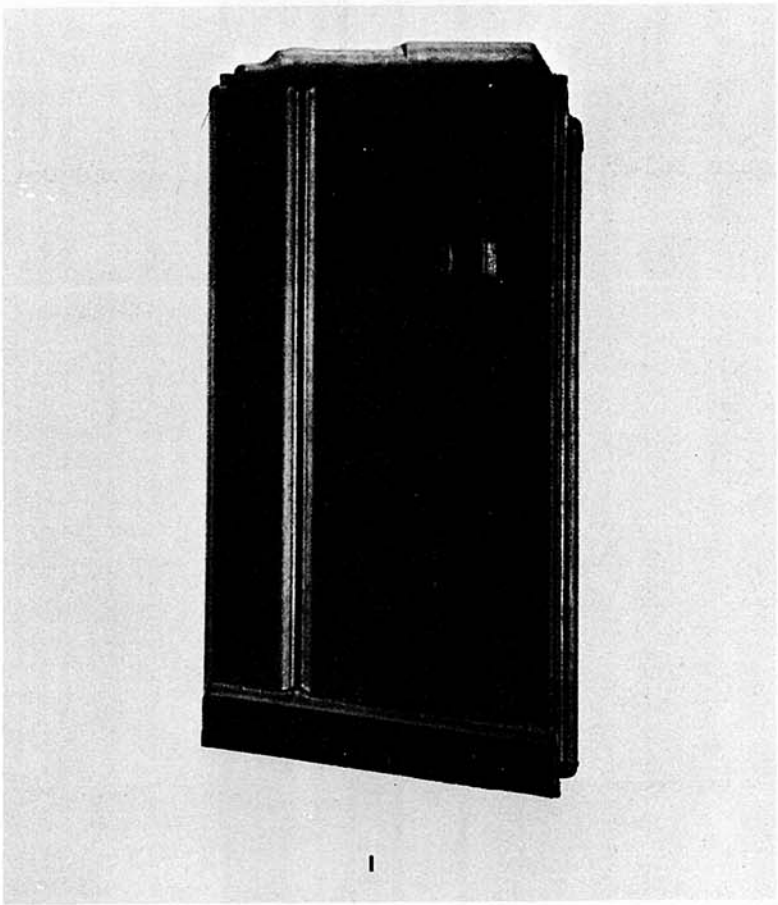

Figure 1.2-1: Magazine Type 1 (LWL, First Design).

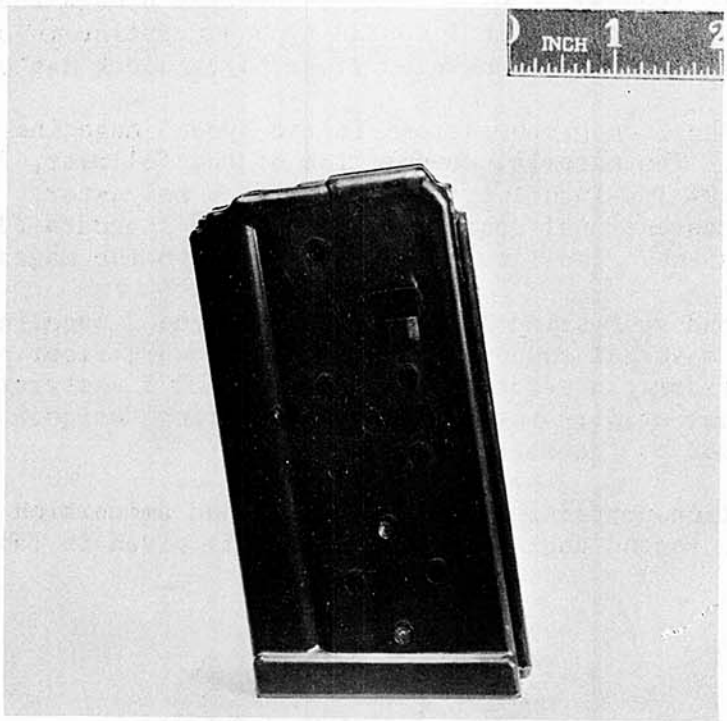

Figure 1.2-2: Magazine Type 1-A (LWL, Second Design).

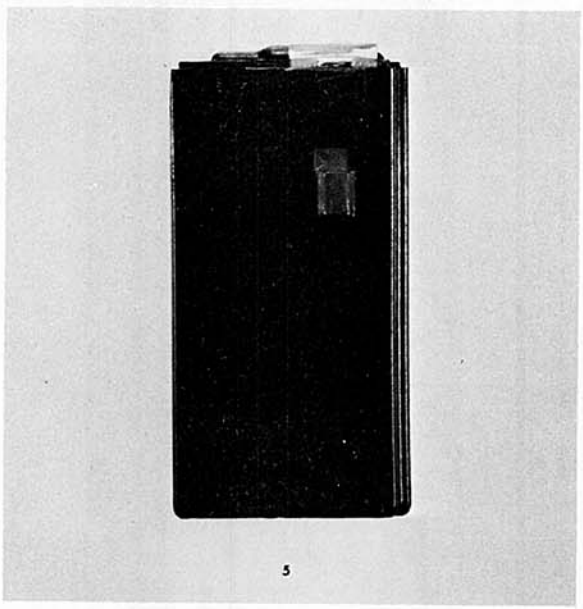

Figure 1.2-3: Magazine Type 5 (RIA, First Design).

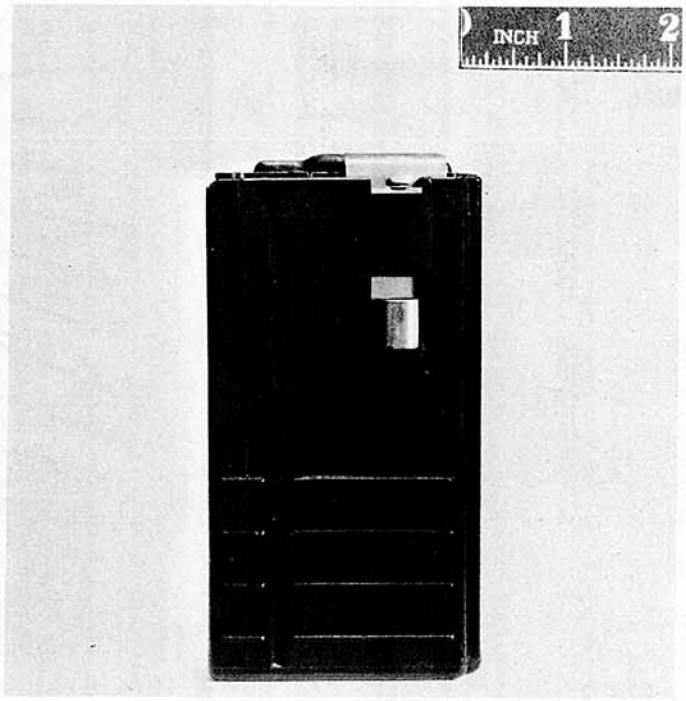

Figure 1.2-4: Magazine Type 5-B (RIA, Second Design).

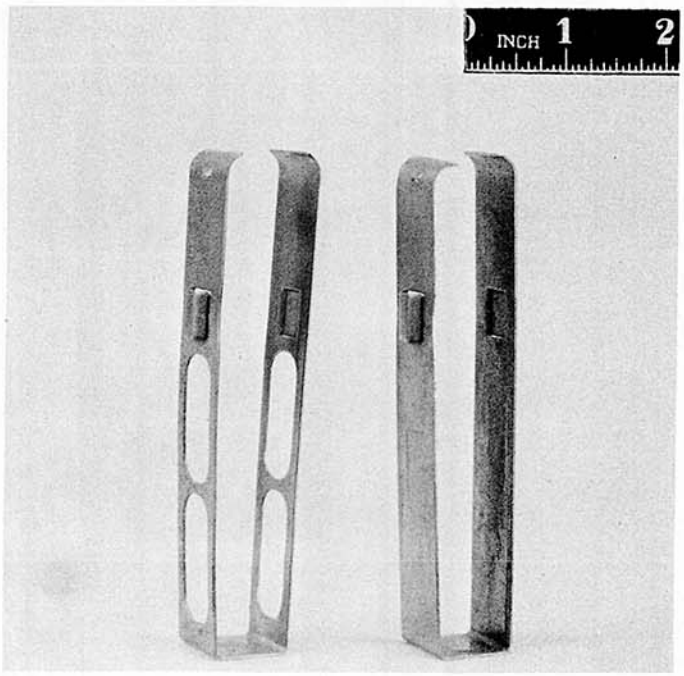

Figure 1.2-5: Two Feed-Lip Designs Found in Type 5-B Magazines.

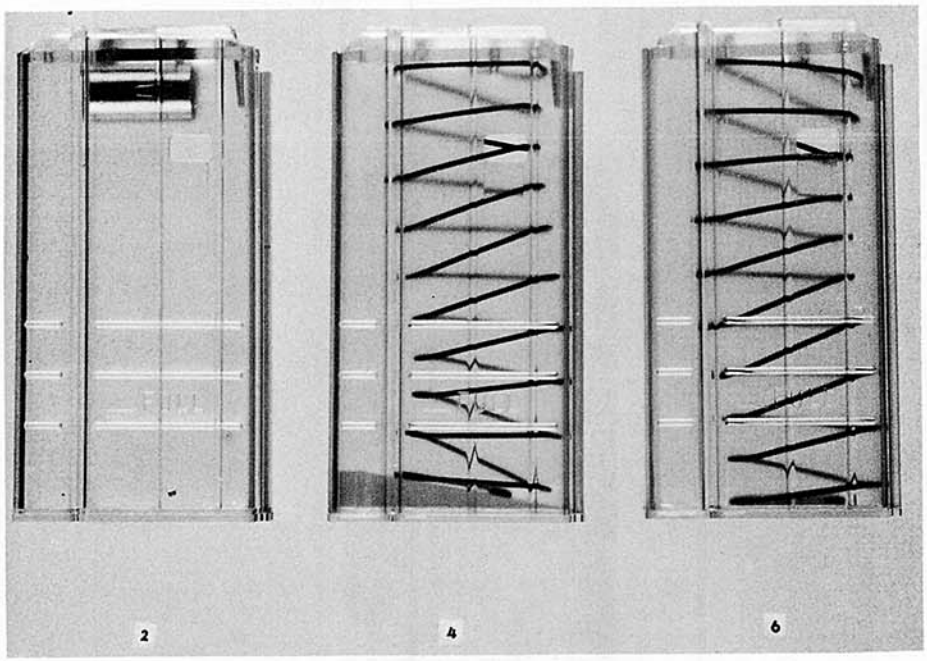

Figure 1.2-6: Code A Magazines. Left to Right: Types 2, 4, and 6.

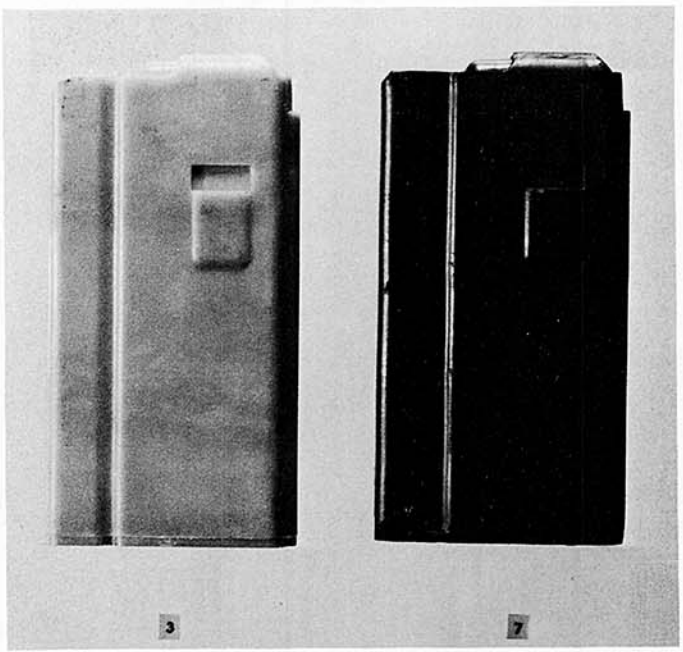

Figure 1.2-7: Code B Magazines (Left to Right, Types 3 and 7).

Table 1.2-I. Test Support Materiel

Serial No.	APG No.	Mode of Fire[a]	Test Utilization		Ammunition		Remarks
			EDT No.	Test Title	Type	Lot No.	
Weapon Type: M16A1.							
118187	D	SA	1 and 2	Function and Durability	Ball, M193	LC-12124	For three loadings of first EDT and first loading of second EDT.
118853	E	B	1 and 2	Function and Durability	Ball, M193	LC-12124	
556787	I	FA	1 and 2	Function and Durability	Ball, M193	LC-12124	
709760	J	SA	1 and 2	Function and Durability	Ball, M193	LC-12124	
138764	K	B	1 and 2	Function and Durability	Ball, M193	LC-12124	
139797	L	FA	1 and 2	Function and Durability	Ball, M193	LC-12124	
					Ball, M193	RA-5101	Used for loadings 2 and 3 of second EDT.
112987	A	SA	1 and 2	Extreme Temperatures (+155, -65, and 0°F)	Ball, M193	LC-12124	
116920	B	B	1 and 2	Extreme Temperatures (+155, -65, and 0°F)	Ball, M193	LC-12124	
118028	C	FA	1 and 2	Extreme Temperatures (+155, -65, and 0°F)	Ball, M193	LC-12124	
[b]197428	F-1	SA	1	Extreme Temperatures (+155 and -65°F)	Ball, M193	LC-12124	
[b]168693	F-2	SA	2	Extreme Temperatures (+155 and 0°F)	Ball, M193	LC-12124	
199090	G	B	1 and 2	Extreme Temperatures (+155, -65, and 0°F)	Ball, M193	LC-12124	
513218	H	FA	1 and 2	Extreme Temperatures (+155, -65, and 0°F)	Ball, M193	LC-12124	
141434	X-1	All modes	1	Heat and Humidity, Chemical Compatibility	Ball, M193	LC-12124	
136515	X-2	All modes	2	Heat, Humidity, Chemical Compatibility	Ball, M193	LC-12124	
141104	Z	All modes	1	Water Immersion	Ball, M193	LC-12124	
			1 and 2	Dust, Sand, and Mud	Ball, M193	[d] -	
140648	4	All modes	1	Extreme Temperatures (+155 and -65°F)	Ball, M193	LC-12124	
Weapon Type: XM148.							
[c]38A	PIP	SS	1	Extreme Temperatures (+155 and -65°F)	Proof XM387E3	MA-33-16	

[a]SA (semiautomatic), B (3- to 5-round burst), FA (fully automatic 20-round burst), SS (single shot).
[b]Rifle No. 197428 was returned to the manufacturer for his evaluation of a malfunction problem which arose during concurrent evaluation of a 30-round magazine. This rifle was not returned to APG in time to be used in the second EDT; therefore, No. 168693 (previously fired 800 rounds at APG) was substituted.
[c]This launcher was attached to rifle No. 140648 for evaluation of 40-mm firing effects on disposable magazine performance and durability.
[d]First EDT, LC12124; second EDT, RA-5101.

1.3 TEST OBJECTIVES

The objective of the first EDT was to provide a basis for low-risk selection of one or more designs which would then be subjected to a second EDT after all necessary design improvements were made. The objective of the second EDT was to directly compare the durability and reliability of the test magazines with that of the standard 20-round metallic magazine for purposes of selection and limited-production procurement of a disposable type magazine if proven suitable.

The aggregate goal of this program is the determination of over-all comparability of the disposable and standard magazines which includes durability, reliability, and cost. This report evaluates the technical aspects only; the cost factor is not considered.

1.4 SUMMARY OF RESULTS

The malfunctions and defects tabulated in this report are those chargeable against the test magazine.

Previously untested magazines were utilized for each subtest, except where noted. Over-all magazine performance is divided into two categories (nonfiring defects and function performance) for all tests except high and low temperatures. The addition of a 5-foot drop test in the temperature environments adds a third evaluation category.

1.4.1 Inspection

Table 1.4-I gives the average weights for ten samples of each magazine tested.

Table 1.4-II gives the results of the visual inspection of all test magazines.

The numerical rating evaluation given in Table 1.4-III summarizes the function-firing performance and nonfiring defects for an over-all evaluation and comparative analysis of the magazines tested.

Table 1.4-I. Magazine Weights

Mfg Name	EDT No.	Magazine Type	Weight, lb, 10-Sample Avg
LWL	1	1	0.17
LWL	2	1-A	.17
RIA	1	5	.28
RIA	2	5-B	.23

Table 1.4-I (Cont'd)

Mfg Name	EDT No.	Magazine Type	Weight, lb, 10-Sample Avg
Code A	1	2	0.13
	1	4	.15
	1	6	.14
Code B	1	3	.20
	1	7	.13
	1 and 2	Control	.19

Table 1.4-II. Visual Inspection for Manufacturing Uniformity

Legend:

U = Uniform.
NU = Not uniform.

Manufacturer and Magazine Type								
LWL		RIA[a]		Code A			Code B[b]	
1	1-A	5	5-B	2	4	6	3	7
U	U	NU	NU	U	U	U	NU	U

[a]The type 5 magazines utilized two feed-lip designs which were randomly distributed among the test samples. Hand-finishing of the feed-lips was not satisfactory. Burrs remained on the lips and caused case scoring.
The type 5-A magazines also utilized two feed-lip designs which were randomly distributed in the test sample. Incorrect assembly during manufacture was not determined until after +155°F and 0°F temperature tests were conducted. The remaining magazines were disassembled with special tooling provided by Rock Island Arsenal and correctly assembled.
[b]The floor-plate bonding material was deposited over the interior and exterior surfaces of the magazines in hard lumps which interfered with insertion of the magazine into the weapon and prevented some followers from being depressed to the maximum depth within the magazine body.

Table 1.4-III. Numerical Rating Evaluation

Magazine Type	Trials with Magazines, All Tests[a]	Magazines Rendered Unserviceable during All Tests	Drop Test Defects, Extreme Temperature Tests Only[b]	Nonfiring Defects, All Tests[c]	Malfunction Rate per 100 Rounds for All Tests	Over-All Evaluation Figure (Sum of Columns 3, 4, and 5
Manufacturer: Limited War Laboratory (LWL).				First EDT		
1	237	0	0.65	0.01	1.18	1.84
Manufacturer: Rock Island Arsenal (RIA).						
5	213	4	1.00	0.49	2.38	3.87
Manufacturer: Code A.						
2	174	2	1.00	0.04	4.39	5.43
4	184	7	1.33	.26	3.83	5.42
6	179	6	1.33	.13	3.57	5.03
Manufacturer: Code B.						
3	168	20	0.50	0.23	3.80	4.53
7	163	11	1.60	.50	2.34	4.44
Control	41	0	0.50	0.00	2.20	2.70
Manufacturer: Limited War Laboratory (LWL).				Second EDT		
1-A	427	0	0.47	0.07	1.28	1.82
Manufacturer: Rock Island Arsenal (RIA).						
5-B	323	42	0.90	0.26	3.47	[d]4.63
Control	398	2	0.25	0.003	1.83	2.08

(See footnotes on page 11.)

Table 1.4-III (Cont'd)

[a]This total includes three loadings of the same magazines during three subtests: function and durability, high-temperature (+155°F), and low-temperature (0°F or -65°F).
[b]Frequency is determined by dividing the defect total by the number of magazine-drop trials. (Refer to Section 2 for the actual number of magazines dropped.)
[c]The frequency total is exclusive of drop-trial defects and is determined by dividing the defect total into the number of magazine trials.
[d]This figure includes the malfunctions and defects of the incorrectly manufactured (reverse-assembled follower springs) magazines. No comparison was made between the extreme-temperature tests and the function and durability results (correctly assembled magazines) to re-evaluate the rate since temperature variations may influence performance.

1.5 CONCLUSIONS

The conclusions, based upon the results of the two engineer design tests are as follows:

a. First Engineer Design Test

1) The over-all evaluation of the LWL (type 1) magazine indicates that it is equal to or better than the other test magazines (ref Table 1.4-III).

2) Although the RIA (type 5) magazine was subject to material failure when drop-tested, the over-all evaluation of this design indicated it was superior to the Codes A and B magazines (ref Table 1.4-III).

3) The Code A magazines (types 2, 4, and 6) are susceptible to material failure when in contact with insecticides and non-standard solvents frequently encountered in the field use (ref Table 1.4-III). Further the malfunction rates for the three types were not acceptable. The over-all evaluation indicates that the Code A products are unsuitable in their present state of development (ref Table 1.4-III and par. 2.11).

4) The Code B magazines (types 3 and 7) are susceptible to material failure because of inherent structural weakness. The malfunction rates for the two types were not acceptable. The over-all evaluation indicates that the Code B products are unsuitable in their present state of development (ref Table 1.4-III).

b. Second Engineer Design Test

1) The LWL (type 1-A) magazine design changes exhibited some reduction in the malfunction rate; however, the design changes introduced BSRW-type malfunctions (bolt stop releases bolt upon withdrawal of magazine) which prevented a significant reduction from being obtained. The over-all evaluation of this design indicates that LWL magazines are comparable to the control magazines, except under adverse conditions (ref Table 1.4-III and par. 2.5).

2) The RIA (type 5-B) magazine design changes exhibited, when properly assembled, a performance improvement from the first EDT items. The over-all evaluation of the RIA design indicates that it is not comparable to the LWL design (ref Table 1.4-III).

1.6 RECOMMENDATIONS

It is recommended that:

a. The Codes A and B magazine designs be excluded from further testing.

b. The LWL magazine be considered for limited production procurement if one of the disposable test magazines is selected to meet the ENSURE requirement. This design (type 1-A) should not be considered finalized, however, since last-round failures of the bolt to remain to the rear (FBR), release of the bolt from the bolt stop during removal of the magazine (BSRW), and required improvement of functional performance under adverse conditions require further design modifications to alleviate these problem areas.

c. The RIA magazine be redesigned to eliminate the follower, magazine body, and feed-lip damage exhibited during drop tests.

d. Tests be conducted to determine the performance of machine-loaded magazines (i.e., prepackaging and long-term storage of loaded magazines).

e. Quality assurance procedures be established to determine if the magazines can be manufactured on a volume basis without performance degradation.

f. The follower springs be treated with a rust and corrosion inhibitor to reduce or eliminate the deterioration of material as a result of saline contamination.

SECTION 2. DETAILS OF TEST

2.1 INTRODUCTION

The magazines of various manufacture and types described in par. 1.2 were subjected to testing and comparative evaluation as detailed in the following subtests.

2.2 EXAMINATION

2.2.1 Objective

To determine design characteristics and manufacturing uniformity of the test magazines.

2.2.2 Criteria

The magazine must be free of material defects. When fully-loaded, the magazine must contain 20 cartridges. The exterior configuration of the magazine must not inhibit its normal insertion and extraction with all weapons. The test item weight should be comparable to that of the standard 20-round magazine.

2.2.3 Method

Visually inspect all magazines for uniformity and correctness of manufacture. Photograph the magazines before and, if appropriate, after completion of testing. Weigh ten samples of each test type. Perform other inspections of the test items, if necessary.

2.2.4 Results

Visual inspection results are given in Table 2.2-I. Photographs are displayed in par. 1.2 (description of material), and in Appendix III for test-produced abnormalities. Table 2.2-II gives the magazine weights.

Table 2.2-I. Visual Inspection

Mfg Name	EDT No.	Magazine Type	Uniform Manufacture Yes	Uniform Manufacture No	Remarks
LWL	1	1	X		
LWL	2	1-A	X		The lower forward edge of the follower is beveled, increasing the allowable forward movement of the follower after the last round is fired. This causes the bolt stop to drop behind the follower.
RIA	1	5		X	Component design variations encountered in feed-lip inserts.
	2	5-B		X	
Code A	1	2, 4, 6	X		
Code B	1	3		X	Bonding material displaced from floorplate area; causes reduction in number rounds that can be loaded into magazine and retards magazine insertion into feedway of the rifle.
Code B	1	7	X		

Table 2.2-II. Weights of Magazines, lb

Sample No.	Test Magazine Type 1	1-A	2	3	4	5	5-B[a]	6	7	Control
1	0.17	0.17	0.13	0.20	0.15	0.28	0.23	0.14	0.13	0.19
2	.17	.17	.13	.20	.15	.28	.23	.14	.13	.19
3	.17	.17	.13	.21	.15	.28	.23	.14	.13	.19
4	.17	.17	.13	.21	.15	.28	.23	.14	.13	.19
5	.17	.17	.13	.20	.15	.28	.23	.14	.13	.19
6	.17	.17	.13	.20	.15	.28	.23	.14	.13	.19
7	.17	.17	.13	.21	.15	.28	.23	.14	.13	.19
8	.17	.17	.13	.21	.15	.28	.23	.14	.13	.19
9	.17	.17	.13	.21	.15	.28	.23	.14	.13	.19
10	.17	.17	.13	.20	.15	.28	.23	.14	.13	.19
Avg	0.17	0.17	0.13	0.20	0.15	0.28	0.23	0.14	0.13	0.19

[a]With perforated (reduced weight) feed-lips.

2.3 FUNCTION AND DURABILITY TEST

2.3.1 Objective

To determine the functional reliability and material durability of the test items.

2.3.2 Criteria

Functional reliability of the test magazine must be comparable to that of the standard 20-round magazine. The test magazine must remain serviceable through the loading and firing of three ammunition complements.

2.3.3 Method

Use six weapons and 40 magazines of each type for this test. Load and test function each magazine three times. Record cyclic rate-of-fire on each 20-round automatic burst fired. Fire the weapons in accordance with the prescribed sequence (Section 3, Appendix I).

Perform maintenance on the weapons prior to test initiation and, thereafter, only if unsatisfactory weapon functioning, not associated with magazine performance, is encountered.

2.3.4 Results

Performance data for the first EDT (seven magazine types) are given in Tables 2.3-I and 2.3-III. These tables are preceded, respectively, by the appropriate defect and malfunction legends. Similar data for the second EDT (two magazine types) are given in Tables 2.3-II and 2.3-IV. The malfunction and defect legends cited above also apply to these tables and all the following tables in the report and appendices. Only malfunctions and defects chargeable to the magazines are represented in this and subsequent tables.

Legend:

FI = Failure of magazine to insert without manual actuation of the magazine latch.
TI = Insertion of the magazine into the lower receiver of the weapon is inhibited.
TE = Extraction of the magazine from the lower receiver of the weapon is inhibited.
HM = High magazine. This condition was created during the adverse conditions testing. In attempts to seat mud-coated

magazines, the force required drives the magazine past the latch and wedges it in the weapon. In this position the bolt contacts the back of the feed-lips. Note: Normal manual extraction of the magazine cannot be accomplished.

E = Ejction of cartridges from the magazine attributable to material failure or temporary deformation.

CF = Cracked follower.

CM = Cracked magazine (body).

DRF = Damaged right feed-lip.

DLF = Damaged left feed-lip.

DRL = Damaged right and left feed-lips.

DFS = Damaged follower spring.

Table 2.3-I. Nonfiring Defects of First EDT Magazines
Function and Durability Test

Magazine Type	No. of Mags	Load No.	Defects												Defect Totals
							Ejected(E) Rds				Feed-Lip Damage				
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	38	3	0	1	0	0	1	1	0	0	0	0	0	1	3
3	39	1	0	2	1	0	8	12	0	11	3	0	0	0	25
	34	2	0	1	0	0	9	44	0	7	5	1	0	0	23
	26	3	0	0	1	0	11	60	0	2	3	1	0	0	18
4	40	1	0	3	2	0	1	1	0	0	0	0	0	0	6
	40	2	0	2	1	0	1	1	0	0	0	0	0	0	4
	40	3	0	1	0	0	1	1	0	0	0	0	0	0	2
5	40	1	7	10	1	0	0	0	0	0	0	0	0	0	18
	39	2	5	8	5	0	0	0	0	0	4	0	0	0	22
	39	3	6	10	6	0	7	25	0	0	4	0	0	0	33
6	40	1	0	0	1	0	0	0	0	0	0	0	0	0	1
	40	2	0	0	2	0	0	0	0	0	0	0	0	0	2
	40	3	0	0	1	0	1	1	0	0	0	0	0	0	2
7	40	1	0	1	2	0	6	8	0	6	0	0	0	0	15
	38	2	0	0	0	0	9	29	0	3	0	1	0	0	13
	36	3	0	1	0	0	9	39	0	1	1	1	0	0	13

Table 2.3-II. Nonfiring Defects of Second EDT Magazines
Function and Durability Test

Maga-zine Type	No. of Mags	Load No.	Defects												Defect Totals
							Ejected(E) Rds				Feed-Lip Damage				
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	3	0	0	0	0	0	0	0	0	0	0	0	0	0
5-B	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	2	0	1	1	0	0	0	0	0	0	0	0	0	2
	40	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Control	40	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	40	3	0	0	0	0	0	0	0	0	0	0	0	0	0

Legend:

FSI	=	Failure to strip the first round from magazine.
FS	=	Failure to strip other than first round from magazine.
STUB	=	Bullet meplat contacts the top front portion of the magazine or the face of the receiver adjacent to the feed ramp.
FF	=	Failure of the follower and spring to position the top cartridge in the magazine in proper alignment with the stripping lug of the bolt.
BOB	=	Bolt overrides base of top cartridge.
Damaged rounds	=	Deformation of the cartridge case created during the chambering cycle.
BOB/DR	=	Same description as BOB except the cases exhibit the damaged rounds condition.
FC/DR	=	Failure to chamber cartridges which exhibit the damaged rounds condition.
DF	=	Double feed; caused by damaged and deformed feed-lips or magazine body.
FBR	=	Failure of the follower to properly actuate the bolt-stop after the last round has been fired.
BSRW	=	This is an FBR condition, except the nose of the bolt-stop slips behind the follower and, upon removal of the magazine, the bolt-stop is cammed downward, thereby releasing the bolt.
BSI	=	The follower actuates the bolt stop prior to firing all cartrides in the magazine, usually caused by deformed feed-lips releasing the last round prematurely.

Table 2.3-III. Function Performance Characteristics of First EDT Magazines
Function and Durability Test

Mag Type	No. Mags Tested	No. Mags without Malfunctions	Load No.	Malfunction Types											Total No. Malfunctions	Avg Cyclic Rate of Fire, rds per min	No. Rds Fired
				FSI	FS	STUB	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI			
1	40	29	1	3	0	4	1	2	0	0	0	1	1	0	12	914	800
	40	33	2	3	0	3	0	1	0	0	0	0	0	0	7	931	800
	40	35	3	3	0	2	0	0	0	0	0	0	0	0	5	930	800
2	40	18	1	11	0	0	7	7	1	1	0	3	0	0	30	910	795
	40	18	2	9	1	0	5	12	1	0	0	0	0	0	28	936	794
	38	19	3	2	1	0	2	17	1	0	0	2	2	0	27	920	756
3	39	16	1	19	1	0	5	2	0	0	4	0	0	0	31	890	735
	34	15	2	12	0	1	0	1	0	0	8	0	0	0	22	920	581
	26	16	3	6	0	1	0	0	0	0	5	0	0	0	12	920	414
4	40	13	1	17	1	0	0	5	3	0	0	6	0	0	32	910	798
	40	18	2	5	2	1	2	8	3	0	0	6	0	0	27	920	797
	40	17	3	9	0	1	7	8	1	0	0	5	0	0	31	929	798
5	40	27	1	6	1	4	0	0	0	0	0	4	0	0	15	904	799
	39	33	2	2	0	1	0	0	0	0	0	3	0	0	6	923	780
	39	29	3	3	0	2	1	0	0	0	5	3	0	0	14	927	755
6	40	22	1	7	1	0	5	5	0	0	0	6	0	0	24	909	800
	40	21	2	10	0	0	3	6	2	0	0	4	1	0	26	935	799
	40	25	3	5	0	0	3	8	0	0	0	6	1	0	23	924	795
7	40	21	1	11	0	0	2	3	0	0	1	1	0	6	24	921	788
	38	24	2	12	0	0	1	1	0	0	0	0	0	3	17	922	735
	36	21	3	14	0	0	2	0	0	0	0	0	0	3	19	905	685

Table 2.3-IV. Functional Performance Characteristics of Second EDT Magazines
Function and Durability Test

Mag Type	No. Mags Tested	No. Mags without Malfunctions	Load No.	Malfunction Types											Total No. Malfunctions	Avg Cyclic Rate of Fire, rds per min	No. Rds Fired
				FSI	FS	STUB	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI			
1-A	40	36	1	0	0	0	0	0	0	0	0	0	4	0	4	903	800
	40	33	2	1	0	1	0	0	0	0	0	1	4	0	7	907	800
	40	35	3	2	0	0	0	0	0	0	0	2	2	0	6	898	800
5-B	40	31	1	5	0	0	0	0	0	0	0	5	0	0	10	894	800
	40	29	2	8	0	0	0	0	0	0	0	4	0	0	12	893	800
	40	31	3	6	0	0	0	0	0	0	0	3	0	0	9	894	800
Control	40	35	1	0	0	0	0	0	1	0	0	4	0	0	5	900	799
	40	36	2	1	0	0	0	0	0	0	0	3	0	0	4	894	800
	40	33	3	2	0	0	0	0	0	0	0	5	0	0	7	891	800

2.3.5 Analysis

The basis for selection of two magazine designs from the first EDT which exhibited the greatest performance potential was partially based upon the results of this subtest. Malfunction rates per 100 rounds fired were 1.50 and 1.88 for the LWL (type 1) and RIA (type 5), respectively. Codes A and B rates ranged between 3.00 and 4.22 which is a significant degradation in performance, comparatively.

Although the RIA (type 5) nonfiring defect total was higher than all other types (first EDT), the inherent material weakness of Code B designs and the adverse reactions to chemical cleaning agents with the Code A designs in other tests caused the function performance results to be considered as the primary guideline in this subtest.

Results of the second EDT indicate that the total nonfiring defects for the modified LWL (type 1-A) and RIA (type 5-B) magazines are comparable to control magazine performance.

The malfunction rate of the control magazine (0.67) is slightly superior to the LWL at (0.71). The malfunction rate for the RIA magazine is 1.29 per hundred rounds fired.

2.4 DUST TEST

2.4.1 Objective

To determine the function performance of the test magazines after exposure to dust.

2.4.2 Criteria

The test item reliability must be comparable to that of the standard 20-round magazine.

2.4.3 Method

Subject ten magazines of each type to the standard dust test in accordance with TECP 700-700, Interim Pamphlet 20-20, 11 April 1967, with the following exceptions: The weapon is not subjected to the dust environment, and maintenance of the weapon is performed prior to firing each magazine type and after every fifth magazine tested within a given type.

2.4.4 Results

Performance data for the first EDT (six magazine types) are given in Tables 2.4-I and 2.4-III.

Data for a supplementary test of five magazine types with protective caps installed are appended in Section 3.

Performance data for the second EDT (two magazine types) are given in Tables 2.4-II and 2.4-IV. Legends given in par.2.3 apply to Tables 2.4-I through 2.4-IV.

2.4.5 Analysis

Results of the first and second EDT dust tests indicate that all the disposable magazine designs do not permit sufficient follower clearance within the magazine body. The exterior dimensions of the control magazine, when fully loaded, permits a free fit within the lower receiver of the M16A1 rifle which is not in evidence with the other designs, especially the second EDT types.

Surface hardness of the control magazine aids in overcoming the tendency of abrasive substances (dust) to imbed in the material. The disposable magazines do not fully possess this attribute.

Table 2.4-I. Nonfiring Defects of First EDT Magazines, Dust Test

Magazine Type	No. of Mags	Defects												Defect Totals
						Ejected(E) Rds				Feed-Lip Damage				
		FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1	10	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	0	0	0	0	0	0	0	0	0	0	0	0	0
3	10	0	0	0	0	1	1	0	1	1	0	0	0	3
4	10	0	3	0	0	0	0	0	0	0	0	0	0	3
5	10	3	5	0	0	0	0	0	0	0	0	0	0	8
6	10	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	Magazine not available for testing.												
Control	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.4-II. Nonfiring Defects of Second EDT Magazines, Dust Test

Magazine Type	No. of Mags	Defects												Defect Totals
						Ejected(E) Rds				Feed-Lip Damage				
		FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	10	0	10	0	0	0	0	0	0	0	0	0	0	10
5-B	10	0	7	0	0	0	0	0	0	0	0	0	0	7
Control	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.4-III. Functional Performance Characteristics of First EDT Magazines, Dust Test

Magazine Type	No. of Mags Tested	No. Mags without Malfunctions	Malfunction Types											Total No. Malfunctions	No. Rds Fired
			FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI		
1	10	7	2	8	0	1	0	0	0	0	0	0	0	11	200
2	10	0	4	1	5	7	14	3	1	0	2	0	0	37	196
3	9	0	8	1	3	3	1	0	0	0	0	0	0	16	161
4	10	1	9	0	1	1	3	2	0	0	3	1	0	20	198
5	10	1	8	0	0	5	9	0	0	0	0	0	0	22	200
6	10	0	10	0	0	3	0	2	0	0	1	1	0	17	198
7	0	Magazines not available for testing.													
Control	10	3	3	0	0	0	0	0	0	0	5	0	0	8	200

Table 2.4-IV. Functional Performance Characteristics of Second EDT Magazines, Dust Test

Magazine Type	No. of Mags Tested	No. Mags without Malfunctions	Malfunction Types											Total No. Malfunctions	Avg Cyclic Rate of Fire, rds/min	No. Rds Fired
			FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI			
1-A	10	5	4	1	0	0	0	0	0	0	0	1	0	6	834	200
5-B	10	1	9	0	0	0	1	0	0	1	3	0	0	14	784	200
Control	10	7	3	1	0	0	0	0	0	0	0	0	0	4	802	200

2.5 SAND TEST

2.5.1 Objective

To determine the function performance of the test magazines after exposure to sand.

2.5.2 Criterion

The test item reliability must be comparable to that of the standard 20-round magazine.

2.5.3 Method

Test ten magazines of each type. Load each magazine prior to testing. Completely cover the magazine with clean, dry silica-core sand. Remove the magazine from the sand, wipe the excess sand from the exterior, invert and shake the magazine to attempt to remove the accumulation of sand from the interior, then test function the magazine. Perform maintenance on the weapon prior to firing each magazine type and after every fifth magazine tested within a given type.

2.5.4 Results

At a meeting of the Disposable Magazine Committee, a determination was made to exclude the first EDT magazines from the sand test.

The performance data for the second EDT magazines are given in Tables 2.5-I and 2.5-II (see Legends in par. 2.3).

2.5.5 Analysis

Subjection of the LWL and RIA magazines to sand contamination appreciably decreases their performance reliability. Their malfunction rates per 100 rounds fired are 6.0 and 9.5, respectively, while the control magazines are virtually unaffected by sand, as evidenced by a rate of only 0.5.

The causes for this variance in performance are the same as analyzed for dust environment (par. 2.4); the sand imbeds into the magazine plastic material.

Table 2.5-I. Nonfiring Defects of Second EDT Magazines
Sand Test

Magazine Type	No. of Mags	Defects												Defect Totals
						Ejected(E) Rds				Feed-Lip Damage				
		FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	10	0	4	0	0	0	0	0	0	0	0	0	0	4
5-B	10	0	7	1	0	0	0	0	0	0	0	0	0	8
Control	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.5-II. Functional Performance Characteristics
of Second EDT Magazines, Sand Test

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	Malfunction Types											Total No. Malfunctions	Average Cyclic Rate of Fire, rds/min	No. Rds Fired
								Damaged Rounds								
			FSI	FS	Stub	FF	BOB	BOB	FC	DF	FBR	BSRW	BSI			
1-A	10	2	8	0	0	4	0	0	0	0	0	0	0	12	-	200
5-B	10	0	10	1	1	1	0	0	0	0	6	0	0	19	863	200
Control	10	9	1	0	0	0	0	0	0	0	0	0	0	1	879	200

2.6 MUD TEST

2.6.1 Objective

To determine the function performance of the test magazines after exposure to mud.

2.6.2 Criterion

The test item reliability must be comparable to that of the standard 20-round magazine.

2.6.3 Method

Test ten magazines of each type. Prepare the mud mixture in accordance with TECP 700-700, Interim Pamphlet 20-20, 11 April 1967. Condition the magazine only by dropping it, fully loaded, into the mud. Quickly retrieve, wipe the mud residue from the exterior surface, invert and shake to attempt to expell the mud from the magazine interior, then test function in the weapon. Maintain the weapon prior to testing each magazine type and after every fifth magazine tested within a given type.

2.6.4 Results

The first EDT magazines were not subjected to the mud test. This determination was made at the meeting of the Disposable Magazine Committee, as noted in par. 2.5.4.

The performance data for the second EDT magazines are given in Tables 2.6-I and 2.6-II (see Legends in par. 2.3).

2.6.5 Analysis

The analysis of malfunction causes previously described in par. 2.4.5 (imbedding of sand and particles) are also relevant to the mud test. Additionally, the lack of an entirely free fit (LWL and RIA magazine) in the lower receiver when uncontaminated, requires the application of considerable force to insert a slightly mud-covered magazine. In the instances where the LWL and RIA magazines were struck with the palm of the hand to ensure correct positioning of the magazine, the magazines (two of each type) overrode the magazine latch stop; becoming securely jammed in the weapon, making it inoperable. This did not occur with the control magazines. Although this condition does not normally exist, it is indicative of what could happen during field use.

Table 2.6-I. Nonfiring Defects of Second EDT Magazines, Mud Test

Magazine Type	No. of Mags	Defects												Defect Totals
						Ejected(E) Rds				Feed-Lip Damage				
		FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	10	0	10	2	2	0	0	0	0	0	0	0	0	14
5-B	10	0	10	2	2	0	0	0	0	0	0	0	0	14
Control	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.6-II. Functional Performance Characteristics of Second EDT Magazines, Mud Test

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	Malfunction Types											Total No. Malfunctions	Average Cylcic Rate of Fire, rds/min	No. Rds Fired
								Damaged Rounds								
			FSI	FS	Stub	FF	BOB	BOB	FC	DF	FBR	BSRW	BSI			
1-A	10	5	0	4	0	7	2	0	0	0	0	0	0	13	581	196
5-B	10	0	3	1	2	14	4	0	0	0	7	0	0	31	-	153
Control	10	4	0	0	0	8	4	0	0	0	0	0	0	12	561	195

2.7 WATER IMMERSION TEST

2.7.1 Objective

To determine the function performance of the test magazine after water immersion.

2.7.2 Criterion

The test item reliability must be comparable to that of the standard 20-round magazine.

2.7.3 Method

Test ten magazines of each type. Immerse the loaded magazines in water (water and magazines to be at equal temperature) for 60 seconds, drain the excess water from the magazine and then test function. Perform weapon maintenance prior to each magazine type. Do not immerse the weapon in water.

2.7.4 Results

In accordance with decisions made at a meeting of the Disposable Magazine Committee held at Headquarters, USATECOM, 12 March 1967, only magazines types 1 and 5 were subjected to this subtest. Performance data for these magazines in the first EDT are given in Table 2.7-I. (Note: This test was not conducted during the second EDT since basic materials were comparable to those used in the first EDT.)

2.7.5 Analysis

The magazine performance in this subtest did not indicate any large variance between magazines, caused by the immersion in water.

Table 2.7-I. Functional Performance Characteristics of First EDT Magazines, Water Immersion Test

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	Malfunction Types											Total No. Malfunctions	No. Rds Fired	Defects
			FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	Damaged Rounds FC	DF	FBR	BSRW	BSI			
1	10	10	0	0	0	0	0	0	0	0	0	0	0	0	200	0
5	10	7	2	0	0	0	0	0	0	0	3	0	0	5	200	0
Control	3	2	0	0	0	0	0	0	0	0	1	0	0	1	60	0

Note: No nonfiring defects were encountered during this test.

2.8 HIGH TEMPERATURE TEST (+155°F)

2.8.1 Objective

To determine the function performance and material durability of the test magazines while exposed to a temperature of +155°F.

2.8.2 Criterion

The test item reliability and durability must be comparable to that of the standard 20-round magazine.

2.8.3 Method

For the first EDT, test ten magazines of each design. Temperature-condition six weapons, loaded magazines, and ammunition at +155°F temperature in accordance with TECP 700-700, Interim Pamphlet 20-20, 11 April 1966. Prior to test firing, drop three samples of each magazine base down from a height of five feet onto a firm, flat surface. If the magazines are still serviceable, test fire 60 rounds from each (three loadings).

For the second EDT, follow the same test procedure as outlined above, except increase the sample size to 40 magazines of each type and drop 20 magazines (each type) base down and the remainder with feed-lips down.

Perform maintenance on the weapons prior to initiation of testing and thereafter only if unsatisfactory weapon functioning, not associated with magazine performance, is evidenced.

2.8.4 Results

During the first EDT drop test, Code A magazines (all types) exhibited separations of the floor plate from the magazine body. Cracks of the feed-lips and magazine body and separation of the floor plate were experienced with both types of the Code B magazines. The RIA magazine exhibited cracking of the magazine body in one instance. No degradation of material was encountered with the LWL magazines. The over-all performance data for the first EDT magazine are given in Tables 2.8-I, 2.8-III, and 2.8-V.

Design modification of the RIA magazine submitted for the second EDT included reduction of the remaining free space, within the magazine, after 20 cartridges are inserted. Because of the cross-sectional area of the follower and this reduction of free space, the followers break

when fully-loaded magazines are base-dropped. Feed-lip drop of the RIA magazine causes splitting of the magazine body and in most instances, withdrawal of the damaged magazine from testing. The LWL magazines were not adversely affected by the drop test.

The high incidence of FBR malfunctions encountered with the RIA magazine is attributed to incorrect assembly of the follower springs during manufacture.

Performance data for the second EDT magazines are given in Tables 2.8-II, 2.8-IV and 2.8-VI.

Supplementary test data (second EDT) for the drop and function testing of RIA magazines with protective caps installed are appended in Section 3.

The results of this supplementary test indicate that the caps, as presently designed, do not materially reduce the breakage of magazines.

Supplementary test data for performance of the magazines, after being subjected to 40-mm, XM148 grenade-launcher recoil shock, are appended in Section 3. Legends for Tables 2.8-I through 2.8-VI are defined in par. 2.3.

2.8.5 Analysis

The function performance was not degraded by follower cracking in the RIA magazines; however, incorrect assembly of the follower spring is extremely detrimental to satisfactory performance.

The material used in the manufacture of protective caps is pliable and easily deformed when subjected to high-temperature drop tests.

The firing of the XM148 grenade launcher does not degrade the performance of the disposable magazines.

Selection of magazine material for its capacity to limit or prevent dimensional and structural changes caused by use (both normal and abusive) is extremely important to the over-all performance of the weapon system. Due to the over-all performance of the LWL and RIA magazines in the first EDT tests, they were judged to be the most promising designs; only these two types were considered for continued temperature testing at -65°F.

Table 2.8-I. Five-Foot Drop Durability of First EDT Magazines, High-Temperature Test (+155°F)

Mag Type	Drop No.	No. Mags Dropped		Defects								Defect Totals
				Ejected(E) Rds					Feed-Lip Damage			
		On Base	Feed-Lips	No. Mags	No. Rds	CF	CM	LS	DRF	DLF	DRL	
1	1	3	-	3	5	0	0	-	0	0	0	3
	2	3	-	2	2	0	0	-	0	0	0	2
2	1	3	-	2	3	0	0	-	0	0	0	2
	2	3	-	3	6	0	1	-	0	0	0	4
3	1	3	-	3	24	0	3	-	0	0	0	6
	2	3	-	-	25	0	3	-	0	0	0	6
4	1	3	-	3	12	0	1	-	0	0	0	4
	2	3	-	3	16	0	0	-	1	0	0	4
5	1	3	-	3	[a]22	0	1	0	0	0	0	4
	2	2	-	2	3	0	0	0	0	0	0	2
6	1	3	-	3	[b]26	0	1	-	0	0	0	4
	2	2	-	2	[b]23	0	2	-	0	0	0	4
7	1	3	-	3	[b]45	0	2	-	0	0	0	5
	2	2	-	2	[b]28	0	1	-	0	0	0	3
Control	1	2	-	0	0	0	0	-	0	0	0	0
	2	2	-	1	2	0	[c]1	-	0	0	0	2

[a]Nineteen rounds ejected from one magazine.
[b]Twenty rounds ejected from one magazine.
[c]Bent floor plate.

Table 2.8-II. Five-Foot Drop Durability of Second EDT Magazines, High-Temperature Test (+155°F)

Mag Type	Drop Orientation	Drop No.	No. Mags Dropped	No. Mags without Drop-Caused Defects	Drop-Caused Defects								Defect Totals
								Feed-Lip Damage			Ejected(E) Rds		
					CF	CM	LS	DRF	DLF	DFL	No. Mags	No. Rds	
1-A	Base	1	20	7	0	0	0	0	0	0	13	13	13
	Feed-Lips		20	5	0	0	0	0	0	0	15	21	15
	Base	2	20	10	0	0	0	0	0	0	10	10	10
	Feed-Lips		20	4	0	0	0	0	0	0	16	23	16
5-B	Base	1	20	[a] -	[a] -	0	0	0	0	0	10	10	10
	Feed-Lips		20	3	0	8	2	1	3	0	15	[b]161	29
	Base	2	20	4	14	2	0	0	0	0	9	[c] 42	25
	Feed-Lips		11	3	0	5	0	0	1	0	8	[d]109	14
Control	Base	1	20	16	-	-	-	0	0	0	4	4	4
	Feed-Lips		20	14	-	-	-	0	0	0	6	8	6
	Base	2	20	20	-	-	-	0	0	0	0	0	0
	Feed-Lips		20	4	-	-	-	0	0	3	13	22	16

[a]Determination as to whether first or second drop caused follower breakage could not be made prior to the second drop and emptying of the magazine in function testing.
[b]A total of 145 rounds was ejected from eight cracked magazines.
[c]Twenty rounds were ejected from one cracked magazine.
[d]A total of 100 rounds was ejected from five cracked magazines.

Table 2.8-III. Nonfiring Defects of First EDT Magazines, High-Temperature Test (+155°F)

Magazine Type	No. of Mags	Load No.	Defects												Defect Totals
							Ejected(E) Rds				Feed-Lip Damage				
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	2	0	0	0	0	0	0	0	1	0	0	0	0	1
	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0
3	10	1	0	2	0	0	5	[a]24	0	2	0	0	0	0	9
	9	2	0	0	0	0	3	29	0	1	1	0	0	0	5
	8	3	0	0	0	0	2	28	0	0	0	0	0	0	2
4	10	1	0	0	0	0	7	21	0	0	0	0	0	0	7
	10	2	0	0	0	0	5	9	0	0	0	0	0	0	5
	10	3	0	0	0	0	6	9	0	1	0	0	0	0	7
5	10	1	4	0	0	0	0	0	0	0	0	0	0	0	4
	9	2	5	0	0	0	0	0	0	0	0	0	0	0	5
	9	3	4	0	0	0	3	3	0	0	0	0	0	0	7
6	10	1	0	1	0	0	4	6	0	0	0	0	0	0	5
	8	2	0	0	0	0	1	3	0	0	0	0	0	0	1
	8	3	0	0	0	0	4	4	0	0	0	0	0	0	4
7	10	1	0	0	1	0	7	[a]32	0	0	0	0	0	0	8
	7	2	0	0	0	0	2	13	0	0	0	0	0	0	2
	7	3	0	0	0	0	2	13	0	0	0	0	0	0	2
Control	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0

[a]One magazine ejected 20 rounds.

Table 2.8-IV. Nonfiring Defects of Second EDT Magazines, High-Temperature Test (+155°F)

Magazine Type	Drop Orientation[a]	No. of Mags	Load No.	Defects												Defect Totals
								Ejected (E) Rds		Feed-Lip Damage						
				FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	Base	20	1	0	0	0	0	[b]	[b]	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	[b]	[b]	0	0	0	0	0	0	0
	Base	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
5-B	Base	19	1	0	8	0	0	[b]	[b]	[b]	[b]	0	0	0	0	8
	Feed-Lips	6		0	0	0	0	[b]	[b]	0	[b]	[b]	[b]	0	0	0
	Base	13	2	0	0	0	0	2	2	2	0	0	0	0	0	4
	Feed-Lips	4		0	0	0	0	3	[c]22	0	0	0	0	0	0	3
	Base	13	3	0	0	0	0	5	5	0	0	0	0	0	0	5
	Feed-Lips	4		0	0	0	0	1	1	0	0	0	0	0	0	1
Control	Base	20	1	0	0	0	0	[b]	[b]	0	0	0	0	0	0	0
	Feed-Lips	20		0	1	0	0	[b]	[b]	0	0	0	0	[b]	0	1
	Base	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	18		0	0	0	0	0	0	0	0	0	0	0	0	0

[a]Magazines were dropped only prior to test functioning of first loading; however, identity by drop orientation was preserved through second and third loadings.
[b]These defects have been included in the drop test, Table 2.8-II.
[c]Twenty rounds ejected from one magazine; the feed lips lost tension.

Table 2.8-V. Function Performance Characteristics of First EDT Magazines, High-Temperature Test (+155°F)

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	Load No.	Malfunction Types											Total No. Malfunctions	No. Rds Fired
									Damaged Rounds							
				FSI	FS	Stub	FF	BOB	BOB	FC	DF	FBR	BSRW	BSI		
1	10	10	1	0	0	0	0	0	0	0	0	0	0	0	0	200
	10	9	2	1	0	0	0	0	0	0	0	0	0	0	1	200
	10	10	3	0	0	0	0	0	0	0	0	0	0	0	0	200
2	10	10	1	0	0	0	0	0	0	0	0	0	0	0	0	200
	10	9	2	0	0	0	0	0	1	0	0	0	0	0	1	200
	10	6	3	1	0	0	0	1	2	0	0	0	0	0	4	200
3	9	9	1	0	0	0	0	0	0	0	0	0	0	0	0	160
	9	8	2	0	0	0	0	0	0	0	1	0	0	0	1	132
	8	8	3	0	0	0	0	0	0	0	0	0	0	0	0	132
4	10	6	1	1	0	0	1	0	1	0	0	1	0	0	4	182
	10	8	2	1	0	0	1	0	0	0	0	0	0	0	2	197
	10	8	3	0	0	0	0	2	0	0	0	0	0	0	2	194
5	9	7	1	2	0	0	0	0	0	0	0	0	0	0	2	180
	9	8	2	0	0	0	0	0	0	0	0	1	0	0	1	180
	9	8	3	1	0	0	0	0	0	0	0	0	0	0	1	179
6	8	4	1	0	2	0	0	3	1	0	0	0	0	0	6	157
	8	5	2	0	0	0	1	3	1	0	0	0	0	0	5	158
	8	5	3	1	0	0	0	2	1	0	0	0	0	0	4	159
7	8	7	1	0	0	0	0	0	2	0	0	0	0	0	2	137
	7	7	2	0	0	0	0	0	0	0	0	0	0	0	0	127
	7	7	3	0	0	0	0	0	0	0	0	0	0	0	0	127
Control	8	4	1	0	0	0	0	0	1	0	0	3	0	0	4	160

Table 2.8-VI. Function Performance Characteristics of Second EDT Magazines, High-Temperature Test (+155°F)

Magazine Type	No. Mags Tested	Drop Orientation	No. Mags without Malfunctions	Load No.	Malfunction Types: Damaged Rounds FSI	FS	Stub	FF	BOB	BOB	FC	DF	FBR[a]	BSRW	BSI	Total No. Malfunctions	Avg Cyclic Rate of Fire, rd/min	No. Rds Fired
1-A	20	Base	16	[b]1	0	0	0	0	0	0	0	0	4	0	0	4	931	400
	20	Feed-Lip	15		0	0	0	0	0	0	0	0	2	3	0	5	923	399
	20	Base	17	2	0	0	0	0	0	0	0	0	2	1	0	3	916	400
	20	Feed-Lip	16		0	0	0	0	0	0	0	0	1	3	0	4	916	400
	20	Base	20	3	0	0	0	0	0	0	0	0	0	0	0	0	917	400
	20	Feed-Lip	16		0	0	0	0	0	0	1	0	0	3	0	4	921	399
5-B	19	Base	1	[b]1	0	0	0	0	0	0	0	0	18	0	0	18	931	380
	6	Feed-Lip	0		0	0	1	0	0	2	0	0	5	0	0	8	916	104
	13	Base	1	2	0	0	0	0	0	0	2	0	11	0	0	13	906	258
	4	Feed-Lip	1		0	0	0	0	0	0	0	0	3	0	0	3	881	80
	13	Base	0	3	0	0	0	0	0	0	1	0	12	0	0	13	934	258
	4	Feed-Lip	1		0	0	0	0	0	1	0	0	2	0	0	3	909	78
Control	20	Base	8	[b]1	0	0	0	0	0	2	5	0	6	0	0	13	903	393
	20	Feed-Lip	8		0	0	1	0	0	0	5	0	7	1	0	14	913	394
	20	Base	7	2	0	0	0	0	0	0	9	0	6	0	0	15	887	392
	20	Feed-Lip	10		0	0	0	0	0	0	10	0	6	0	0	16	897	366
	20	Base	7	3	0	0	0	0	0	2	7	0	11	0	0	20	906	393
	18	Feed-Lip	5		0	0	0	0	0	0	2	0	11	0	0	13	891	378

[a]The follower springs were reverse-assembled during manufacture of type 5-B magazines; therefore, these totals may not reflect true performance of the test item with regard to FBR-type malfunctions.

[b]The drop test was performed only prior to function testing of the first magazine loading. Identity, by drop orientation, was preserved through second and third loadings.

2.9 LOW-TEMPERATURE TESTS (0°F AND -65°F)

2.9.1 Objective

To determine the function performance and material durability of the test magazines during exposure to temperatures of 0°F and -65°F.

2.9.2 Criterion

The test item reliability and durability must be comparable to that of the standard 20-round magazine.

2.9.3 Method

For the first EDT, test ten magazines of design types 1 and 5. Temperature-condition six weapons, loaded magazines, and ammunition at -65°F temperature in accordance with TECP 700-700, Interim Pamphlet 20-20, 11 April 1966. Prior to test functioning, drop each magazine base down from a height of five feet onto a firm, flat surface. If still serviceable after the drop test, fire 60 rounds from each magazine (three loadings).

For the second EDT, follow the test procedures outlined above, except for the following: temperature-condition all items at 0°F, increase the sample size to 40 magazines each of types 1 and 5, and drop the first 20 magazines of each type base down and the remainder with feed-lips down.

Perform maintenance on the weapons prior to initiation of testing and, thereafter, only if unsatisfactory weapon functioning, not associated with magazine performance, is encountered.

2.9.4 Results

The LWL and RIA magazines were tested at -65°F temperature to provide data to the manufacturers on performance of their designs at temperatures below the SEA requirement of 0°F. The RIA material cracked during the drop test, therefore only the LWL magazines were tested for more than one loading. Performance data for the first EDT magazines are given in Tables 2.9-I, 2.9-III, and 2.9-V.

In the second EDT, the drop-test results indicate that drop-testing still adversely affects the RIA magazines. Incorrect assembly of the follower springs (see results in par. 2.8.4) contributed to the high incidence of FBR malfunctions (see Tables 2.9-II, 2.9-IV, and 2.9-VI).

Supplementary test data (first EDT) for effects on performance after 40-mm, XM148 grenade launcher firing are appended in Section 3.

Supplementary test data (second EDT) for the drop and function testing of RIA-design magazines with protective caps installed are appended in Section 3, Appendix I.

Legends for Tables 2.9-I through 2.9-VI are defined in paragraph 2.3.

2.9.5 Analysis

Follower cracks encountered during the second EDT drop test do not adversely affect the function firing performance of the RIA magazine; however, incorrect assembly of the follower spring does greatly degrade performance.

The 40-mm grenade launcher recoil shock (first EDT) does not affect the performance of the disposable magazines.

Protective caps for the RIA design magazines (second EDT) do not eliminate drop-test damage.

Table 2.9-I. Five-Foot Drop Durability of First EDT Magazines, Low-Temperature Test (-65°F)

Magazine Type	Drop No.	No. Mags Dropped		Defects								
				Ejected(E) Rds					Feed-Lip Damage			Defect Totals
		Base	Feed-Lips	No. Mags	No. Rds	CF	CM	LS	DRF	DLF	DFL	
1	1	10	-	7	10	0	0	-	0	0	0	7
	2	10	-	5	5	0	0	-	0	0	0	5
5	1	7	-	4	11	0	2	0	0	0	0	6
	2	7	-	5	40	0	2	0	0	0	0	7
Control	1	5	-	2	4	0	0	-	0	0	0	2
	2	5	-	2	2	0	[a]1	-	0	0	0	3

[a]Floor plate bent at rear.

Table 2.9-II. Five-Foot Drop Durability of Second EDT Magazines, Low-Temperature Test (0°F)

Magazine Type	Load No.	Drop Orientation	Drop No.	No. Mags Dropped	No. Mags without Drop-Caused Defects	Drop-Caused Defects: Feed-Lip Damage CF	CM	LS	DRF	DLF	DFL	Ejected(E) Rds: No. Mags	No. Rds	Defect Totals
1-A	1	Base	1	20	19	0	0	-	0	0	0	1	1	1
		Feed-Lips		20	10	0	0	-	0	0	0	10	13	10
		Base	2	20	17	0	0	-	0	0	0	3	3	3
		Feed-Lips		20	13	0	0	-	0	0	0	7	9	7
5-A	1	Base	1	22	[a] -	[a] -	0	0	0	0	0	4	5	4
		Feed-Lips		18	5	0	6	1	0	4	0	9	48	20
		Base	2	22	1	20	0	0	0	0	0	2	4	22
		Feed-Lips		12	7	0	1	1	0	0	0	4	8	6
Control	1	Base	1	20	20	0	0	-	0	0	0	0	0	0
		Feed-Lips		20	13	0	0	-	0	0	0	7	9	7
		Base	2	20	19	0	0	-	0	0	0	1	1	1
		Feed-Lips		20	14	0	0	-	0	1	0	5	9	6

[a]Determination as to whether the first or second drop caused breakage of the follower could not be made prior to emptying of the magazine in the functioning test following the second drop; therefore, the number of these defects is given in the second drop test.

Table 2.9-III. Nonfiring Defects of First EDT Magazines, Low-Temperature Test (-65°F)

Magazine Type	No. of Mags	Load No.	Defects											Defect Totals
							Ejected(E) Rds				Feed-Lip Damage			
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0
5	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Control	10	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.9-IV. Nonfiring Defects of Second EDT Magazines, Low-Temperature Test (0°F)

Magazine Type	Drop Orientation[a]	No. of Mags	Load No.	Defects												Defect Totals
								Ejected(E) Rds				Feed-Lip Damage				
				FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	Base	20	1	0	0	0	0	b_	b_	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	b_	b_	0	0	0	0	0	0	0
	Base	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
5-B	Base	22	1	0	0	0	0	b_	b_	b_	b_	0	0	0	0	0
	Feed-Lips	11		0	0	0	0	b_	b_	b_	b_	0	b_	0	0	0
	Base	15	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	9		0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	9		0	0	0	0	0	0	0	1	0	0	0	0	1
Control	Base	20	1	0	0	0	0	b_	b_	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	b_	b_	0	0	0	0	0	0	0
	Base	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	Feed-Lips	20		0	0	0	0	0	0	0	0	0	0	0	0	0

[a]Magazines were drop-tested only prior to function test of the first load. Identity of drop orientation was preserved through second and third loadings.
[b]These figures are included in Table 2.9-II, defect totals.

Table 2.9-V. Function Performance Characteristics of First EDT Magazines, Low-Temperature Test (-65°F)

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	Load No.	Malfunction Types											Total No. Malfunctions	No. Rds Fired
				FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	Damaged Rounds FC	DF	FBR	BSRW	BSI		
1	10	7	1	0	0	3	0	0	0	0	0	0	0	0	3	200
	10	3	2	1	1	5	0	0	0	0	0	0	0	0	7	200
	10	4	3	0	1	6	0	0	0	0	0	0	0	0	7	200
5	9	2	1	5	1	0	5	4	0	0	0	2	0	0	17	144
Control	10	7	1	1	0	1	0	0	0	0	0	1	0	0	3	200

Table 2.9-VI. Function Performance Characteristics of Second EDT Magazines, Low-Temperature Test (0°F)

Magazine Type	No. Mags Tested	Drop Orientation[a]	No. Mags without Malfunctions	Load No.	Malfunction Types											Total No. Malfunctions	Average Cyclic Rate of Fire, rd/min	No. Rds Fired
					FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	Damaged Rounds FC	DF	FBR	BSRW	BSI			
1-A	20	Base	16	1	2	0	1	0	0	0	0	0	0	1	0	4	934	400
	20	Feed-Lips	15		1	0	0	0	0	0	0	0	0	5	0	6	925	400
	20	Base	17	2	0	0	0	0	0	0	0	0	0	3	0	3	930	400
	20	Feed-Lips	14		0	0	1	0	1	1	0	0	1	4	0	8	948	399
	20	Base	16	3	0	0	1	0	0	0	0	0	0	4	0	5	990	400
	20	Feed-Lips	14		1	0	0	0	1	0	0	0	1	4	0	7	950	400
5-B	22	Base	3	1	0	0	0	0	0	0	0	0	19	0	0	19	932	440
	11	Feed-Lips	4		0	0	0	0	0	0	0	0	6	0	1	7	886	217
	15	Base	3	2	0	0	0	0	0	0	0	0	12	0	0	12	954	300
	9	Feed-Lips	2		0	0	0	0	0	0	0	0	7	0	0	7	915	180
	11	Base	2	3	0	0	0	1	0	0	0	0	8	0	0	9	973	204
	9	Feed-Lips	2		0	0	0	0	0	0	0	0	7	0	0	7	926	180
Control	20	Base	17	1	0	0	0	0	0	0	0	0	3	0	0	3	919	400
	20	Feed-Lips	15		0	0	2	0	0	0	1	0	2	0	0	5	928	398
	20	Base	17	2	0	0	0	0	0	0	0	0	3	0	0	3	925	400
	20	Feed-Lips	16		0	0	0	0	0	0	0	0	4	0	0	4	933	400
	20	Base	17	3	0	0	0	0	0	0	0	0	3	0	0	3	951	400
	20	Feed-Lips	18		1	0	0	0	0	0	0	0	1	0	0	2	970	400

[a]The drop test was performed only prior to test functioning of the magazines. Identity of drop orientation was preserved through the second and third loadings.

2.10 HEAT AND HUMIDITY TEST

2.10.1 Objective

To determine the function performance of the test magazines after exposure to a heat and humidity environment.

2.10.2 Criterion

The test item reliability must be comparable to that of the standard 20-round magazine.

2.10.3 Method

Conduct the test in accordance with TECP 700-700, Interim Pamphlet 20-20, 11 April 1966, except to condition the loaded magazines only and test function five magazines of each type on the fifth and tenth days of the conditioning cycle.

Perform maintenance on the test weapon prior to testing each magazine type.

2.10.4 Results

Test data for five- and ten-day conditioning periods are given in Tables 2.10-I and 2.10-III for the first EDT and Tables 2.10-II and 2.10-IV for the second EDT.

A supplementary test was introduced into the second EDT. Ten additional magazines of each type were loaded and immersed for one minute in a 20% saline solution prior to introduction into the temperature humidity environment. Test results for the supplementary testing are appended in Section 3.

Legends for the tables are defined in par. 2.3

2.10.5 Analysis

The over-all performance of first and second EDT magazines did not give evidence that any appreciable variance in functioning or durability was created by the heat and humidity environment.

The introduction of a saline solution (ref Appendix I) to the test and control magazines, did prevent this supplementary test from being completed because of corrosion of the cartridges and rusting of the steel components.

Table 2.10-I. Nonfiring Defects of First EDT Magazines, Heat and Humidity Test

Magazine Type	No. of Mags	No. Days Cond	Defects												Defect Totals
							Ejected(E) Rds				Feed-Lip Damage				
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1	5	5	0	0	1	0	1	1	0	0	0	0	0	0	2
	5	10	0	0	0	0	1	1	0	0	0	0	0	0	1
2	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0
3	5	5	0	2	1	0	2	14	0	2	0	0	0	0	7
	5	10	0	0	0	0	3	20	0	1	0	0	0	0	4
4	5	5	0	1	0	0	2	2	0	0	0	0	0	0	3
	5	10	0	0	0	0	4	18	0	0	0	0	0	0	4
5	5	5	0	1	4	0	1	1	0	0	0	0	0	0	6
	5	10	0	0	0	0	1	1	0	0	0	0	0	0	1
6	5	5	1	0	0	0	5	7	0	0	0	0	0	0	6
	5	10	0	0	0	0	3	6	0	0	0	0	0	0	3
7	5	[a] 3	0	0	3	0	3	17	0	1	0	0	0	0	7
Control	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0

[a]These magazines were delivered for testing after the heat and humidity cycle was initiated, which permitted only three days conditioning prior to test.

Table 2.10-II. Nonfiring Defects of Second EDT Magazines, Heat and Humidity Test

Magazine Type	No. of Mags	No. Days Cond	Defects												Defect Totals
							Ejected(E) Rds				Feed-Lip Damage				
			FI	TI	TE	HM	No. Mags	No. Rds	CF	CM	DRF	DLF	DFL	DFS	
1-A	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0
5-B	5	5	0	3	0	0	0	0	0	0	0	0	0	0	3
	5	10	0	5	0	0	5	8	0	0	0	0	0	0	10
Control	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	10	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2.10-III. Function Performance Characteristics of First EDT Magazines, Heat and Humidity Test

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	No. Days Cond	Malfunction Types											Total No. Malfunctions	Average Cyclic Rate of Fire, rd/min	No. Rds Fired
				FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI			
1	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	885	100
	5	5	10	0	0	0	0	0	0	0	0	0	0	0	0	902	99
2	5	0	5	1	0	0	0	5	1	0	0	0	0	0	7	908	99
	5	0	10	0	0	0	2	5	0	0	0	0	0	0	7	898	100
3	5	0	5	4	0	0	1	1	0	0	0	0	0	0	6	892	87
	5	4	10	1	0	0	0	0	0	0	0	0	0	0	1	890	81
4	5	1	5	1	0	1	4	7	0	0	0	0	0	0	13	895	79
	5	4	10	0	0	0	0	1	0	0	0	0	0	0	1	892	92
5	5	4	5	1	0	0	0	0	0	0	0	0	0	0	1	898	100
	5	4	10	0	0	1	1	8	0	0	0	0	0	0	10	892	99
6	5	1	5	1	0	0	1	3	0	0	0	0	0	0	5	898	97
	5	1	10	2	0	2	3	3	0	0	0	0	0	0	10	895	100
7	5	4	[a] 3	0	0	0	1	0	0	0	0	0	0	0	1	892	100
Control	5	4	5	0	0	0	0	0	0	0	0	1	0	0	1	892	100
	5	4	10	0	0	0	0	0	0	0	0	1	0	0	1	898	100

[a]These magazines were delivered for testing after the heat and humidity cycle was initiated, which permitted only three days conditioning prior to test.

Table 2.10-IV. Function Performance Characteristics of Second EDT Magazines, Heat and Humidity Test

Magazine Type	No. Mags Tested	No. Mags without Malfunctions	No. Days Cond	Malfunction Types											Total No. Malfunctions	Average Cyclic Rate of Fire, rd/min	No. Rds Fired
				FSI	FS	Stub	FF	BOB	Damaged Rounds BOB	FC	DF	FBR	BSRW	BSI			
1-A	5	2	5	0	0	0	0	0	0	0	0	0	3	0	3	904	100
	5	3	10	0	0	0	0	0	0	0	0	1	1	0	2	896	100
5-B	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	930	100
	5	5	10	0	0	0	0	0	0	0	0	0	0	0	0	910	100
Control	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	900	100
	5	4	10	0	0	0	0	0	1	0	0	0	0	0	1	887	100

2.11 SOLVENTS AND LUBRICANTS COMPATIBILITY TEST

2.11.1 Objective

To determine the chemical compatibility of the test magazines with various chemical compounds used as cleaners, lubricants, and insecticides.

2.11.2 Criterion

The durability and functional operation of the test magazines must not be degraded by reaction of the design material to various chemical compounds.

2.11.3 Method

Immerse three unloaded magazines of each type for ten minutes in the following fluids (three previously untested magazines to each fluid): bore cleaner (MIL-L-372B), gasoline, kerosene, diesel fuel, dry cleaning solvent (PS-661-B), VV-L-800, MIL-L-14107, and MIL-L-46000. Allow all the magazines to drain for 24 hours at ambient temperature, load with 20 cartridges and test fire. Apply insect repellant (FSN 6840-558-0918) to three loaded magazines of each type by coating the hands with insect repellant and immediately grasping the magazines, ensure that the feed-lip area is contacted. Allow 24 hours to lapse prior to test firing.

Inspect all magazines during the various stages of this test for adverse reaction to chemicals and determine the extent of functional performance degradation, if experienced.

2.11.4 Results

Results of the first EDT indicated that the functional performance of the LWL (type 1) and RIA (type 5) magazines were not adversely affected by the chemicals tested. Magazines manufactured by Code A (types 2, 4, and 6) were adversely affected by insect repellant, gasoline, kerosene and diesel fuel. Functional performance degradation attributed to chemical incompatibility could not be determined for Code B (types 3 and 7) magazines because of the inherent material failure which was common to all tests conducted.

Results of the second EDT indicate that the LWL and RIA magazines are not adversely affected by the chemicals tested (Tables 2.11-I and 2.11-II). (Note: These magazines were previously utilized for three loadings in the function and durability test. They are judged to be serviceable prior to this test.)

2.11.5 Analysis

Although the Code A magazines (all types) are constructed of a reasonably durable unfilled polycarbonate materiel, their performance is unsatisfactory after being subjected to contact with insect repellant and nonstandard cleaning solvents.

Table 2.11-I. Function Performance Characteristics of First EDT Magazines, Chemical Compatibility Test

Chemical Type	Reaction of Magazine Material to Chemicals — Magazine Type 1	2	3	4	5	6	7
Insect repellant (FSN-6840-558-0918)	No	No[a]	No	No	No	No	No
Bore cleaner (MIL-L-372B)	No	No	No	No	No	No	No
Gasoline[b]	No	-	No	Yes	No	Yes	No
Kerosene[b]	No	-	No	Yes	No	Yes	No
Diesel fuel[b]	No	-	No	Yes	No	Yes	No
Dry cleaning solvent (PS-661-B)	No	-	No	No	No	-	No
VV-L-800	No	-	No	No	No	-	No
MIL-L-14107	No	-	No	-	No	-	No
MIL-L-46000	No	-	No	-	No	-	No
Malfunction rate per 100 rounds (function tests)	0.56	10.42	3.48	2.16	1.11	3.65	2.52

[a]Although no immediate degradation of functioning was evidenced, the area surrounding the follower spring rivet holes (adjacent to the right feed-lip) exhibited stress cracks on all three test samples.

[b]Feed-Lip breakage occurred on type 4 and 6 magazines.

Note: Dashes indicate no test due to insufficient quantity of magazines available.

Table 2.11-II. Function Performance Characteristics of Second EDT Magazines, Chemical Compatibility Test

Chemical Type	Reaction of Magazine Material to Chemicals — Magazine Type 1-A	5-B
Insect repellant (FSN-6840-558-0918)	No	No
Bore cleaner (MIL-L-372B)	No	No
Gasoline	No	No
Kerosene	No	No
Diesel fuel	No	No
Dry cleaning solvent (PS-661-B)	No	No
VV-L-800	No	No
MIL-L-14107	No	No
MIL-L-46000	No	No
Malfunction rate per 100 rounds (function tests)	0.56	1.30

SECTION 3. APPENDICES

APPENDIX I - TEST DATA

Legend:

SA = Semiautomatic fire.
B = Burst fire.
FA = Full automatic fire.
FSI = Failure to strip the first round from magazine.
FF = Failure of the follower and spring to position the top cartridge in the magazine in proper alignment with the stripping lug of the bolt.
BOB = Bolt overrides base of top cartridge.
FBR = Failure of the follower to properly actuate the bolt-stop after the last round has been fired.
CF = Cracked follower.
CM = Cracked magazine (body).
DLF = Damaged left feed-lip.

EDT Nos. 1 and 2, Function and Durability Test, Firing Sequence

Mode of fire	SA	B	FA	FA	B	FA
APG weapon No.	D	E	I	J	K	L
Firing cycle	1	2	3	4	5	6
			Magazine Types			
	A	B	C	A	B	C
	B	C	A	B	C	A
	C	A	B	C	A	B
	A	B	C	A	B	C
	B	C	Q	B	C	A
Firing cycle	7	8	9	10	11	12
	C	A	B	C	A	B
	A	B	C	A	B	C
	B	C	A	B	C	A
	C	A	B	C	A	B
	A	B	C	A	B	C
Firing cycle	13	14	15	16	17	18
	B	C	A	B	C	A
	C	A	B	C	A	B
	B	C	A	B	C	A
	C	A	B	C	A	B

Firing cycle	19	20	21	22	23	24
	A	B	C	A	B	C
	B	C	A	B	C	A
	C	A	B	C	A	B
	A	B	C	A	B	C
	B	C	A	B	C	A

Note: Similar sequences for all other subtests were used.

Table I-I. Supplementary Dust Test of First EDT, Magazines with Protective Caps

Magazine Type	No. Mags Tested	No. Rds Fired	Functional Performance Characteristics: Malfunction Types FSI	FF	BOB	FBR	Total No. Malfunctions	Defect Totals
2	1	20	0	0	1	1	2	0
3	1	20	1	0	0	0	1	0
4	1	20	1	0	1	1	3	0
5	1	20	1	1	0	0	2	0
6	1	20	0	0	1	1	2	0

Note: The dust covers were designed for the type 5 (RIA) magazine. These covers would not properly fit the type 1 (LWL) magazine, therefore, type 1 magazines were not tested. The type 7 design was not available for testing.

Table I-II. Supplementary Drop and Function Test of Second EDT (Type 5-A), Magazines at +155°F, Magazines with Protective Caps Installed

Drop Orientation	No. Mags Dropped	Drop-Caused Defects: CF	CM	DLF	Ejected (E) Rds: No. Mags	No. Rds	Defect Totals	No. Mags Test-Fired	Malfunc, FBR
Base	5	4	0	0	2	2	6	5	2
Feed-Lips	5	0	2	1	3	24	6	2	0

Note: The protective caps were deformed when drop-oriented to the feed-lips. Material very pliable at +155°F, indicating reduction in strength due to heat.
Follower springs were correctly assembled in these magazines.

Table I-III. Supplementary Drop and Function Test, of Second EDT (Type 5-A), Magazines at 0°F Magazines with Protective Caps Installed

Drop Orientation	No. Mags Dropped	Drop-Caused Defects				Defect Totals	No. Mags Test-Fired	Malfunc, FC - DR
		CF	CM	Ejected(E) Rds No. Mags	Ejected(E) Rds No. Rds			
Base	5	4	1	0	0	5	5	1
Feed-Lips	5	0	0	3	3	3	5	0

Note: Deformation of the protective caps caused by the 5-foot drop was less than that experienced at +155°F.
Follower springs were correctly assembled in these magazines.

Table I-IV. Round-By-Round Data for First EDT Results of XM148 Grenade Launcher Firing to Determine Functional and Durability Characteristics

Magazine No.	No. Rds Fired XM148	No. Rds Fired M16A1	Mode of Fire	Function Rd No.	Function Mag	Function M16A1	Function XM148	Remarks
Magazine Type: 1. Weapon: No. 4.							XM148 test at +155°F.	
1	25		SS	19			FJ	
		20	SA					
2	25		SS					
		20	B					
3	25		SS					
		20	FA	20	FBR			
Magazine Type: 2. Weapon: No. 4.							XM148 test at +155°F.	
1	25		SS					
		20	SA					
2	25		SS					
		20	B					
3	25		SS					
		20	FA	5		FJ		

Magazine No.	No. Rds Fired XM148	No. Rds Fired M16A1	Mode of Fire	Function Rd No.	Function Mag	Function M16A1	Function XM148	Remarks
Magazine Type: 3. Weapon: No. 4.								XM148 test at +155°F.
1	25		SS					
		20	SA	0	CM			
2	25		SS					
		19	B	0	E-1			
				0	CM			
3	25		SS					
		20	FA	0	CM			
Magazine Type: 4 Weapon: No. 4.								XM148 test at +155°F.
1	25		SS					
		18	SA	0	E-2			
2	25		SS					
		15	B	0	E			
3	25		SS					
		17	FA	0	E-4			
Magazine Type: 5. Weapon: No.								XM148 test at +155°F.
1	25		SS					
		20	SA					
2	25		SS					
		20	B	5				
				20	FBR	FJ		
3	25		SS					
		20	FA	20	FBR			
Magazine Type: 6. Weapon: No. 4.								XM148 test at +155°F.
1	25		SS					
		20	SA	0	E-1			
				1	FS1			
				13		FJ		
				19		FJ		
2	25		SS					
		19	B	0	E-2			
3	25		SS					
		20	FA	14		FJ		
				14	FF			Spring jam.
				18	FF			Spring jam.

Magazine Type	No. Rds Fired XM148	No. Rds Fired M16A1	Mode of Fire	Function Rd No.	Function Mag	Function M16A1	Function XM148	Remarks
Magazine Type: 7. Weapon: No. 4.					XM148 test at +155°F.			
1	25		SS					
		20	SA					
2	25		SS					
		2	B	0	E-18			Magazine inadvertently dropped. Crack at rear.
				0	CM			
				20	FBR			
3	25		SS					
		17	FA		E-3			
Magazine Type: 1. Weapon: No. 4.					XM148 test at -65°F.			
1	21		SS	1,5,6 20,21			FFR	No. 21 was low-order ignition. Projectile lodged in bore of launcher.
				5-12, 18,20, 21			FX	Cases out of round. Extractor broke at round 21.
		20	SA	1	FSI			
				13		FJ		
				20		FJ		
2	25		SS	1			FFR	Low-order ignition. Projectile lodged in bore of launcher.
				1-25			FX	Extractor broke on round 1, did not replace.
		20	B					
3	25		SS	1-25			FX	Same remark as previous.
		20	FA	1	Stub			
				20		CHR		Charging handle rebounded after firing last round and struck gunner in the nose.

APPENDIX II - PHOTOGRAPHS

Photographs of the first EDT magazine exhibiting material failures.

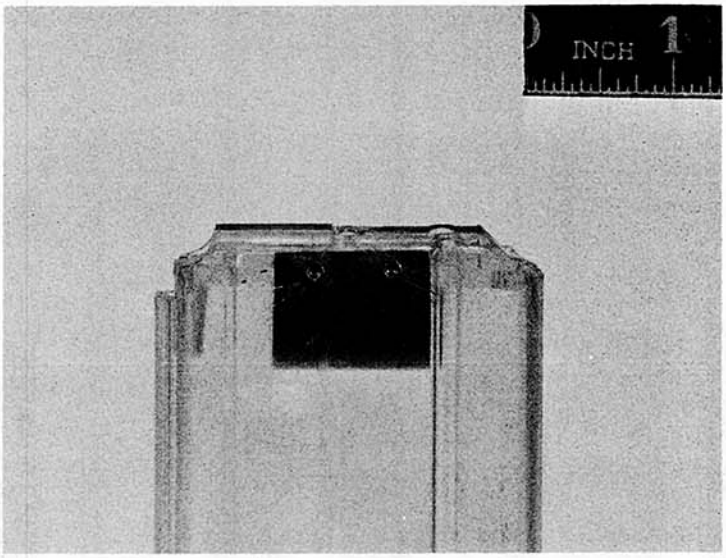

Figure II-1: Magazine Type 2 (Code A) Exhibiting Stress Cracking Caused by Insect Repellant Reaction to the Unfilled Polycarbonate Material.

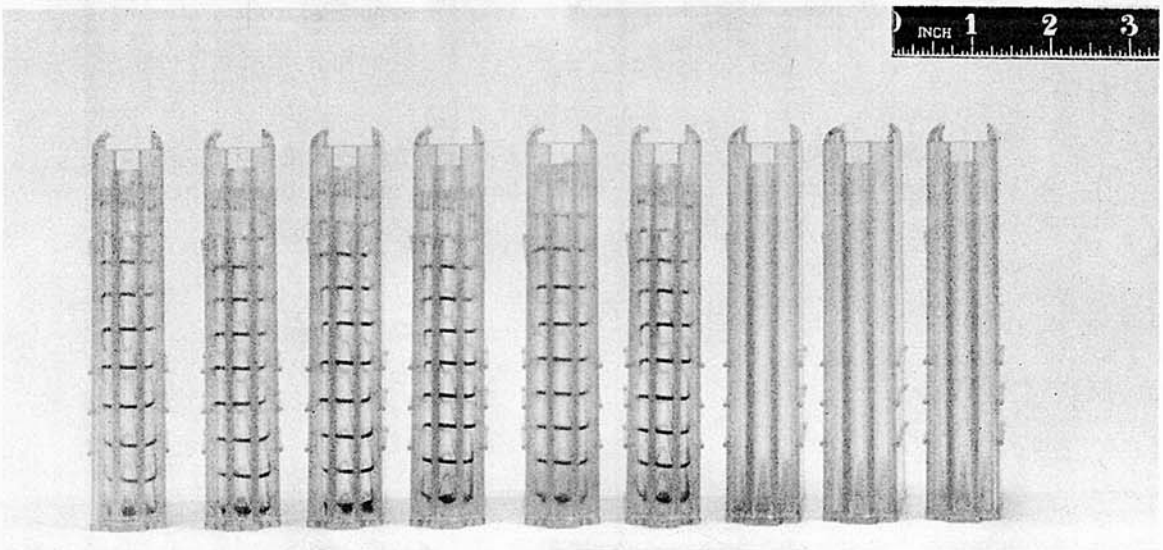

Figure II-2: Magazine Types 4 and 6 (Code A) Exhibiting Material Failure of the Right Feed-Lip (Broken Off) Caused by Chemical Reaction to Gasoline, Kerosene, and Diesel Fuel.

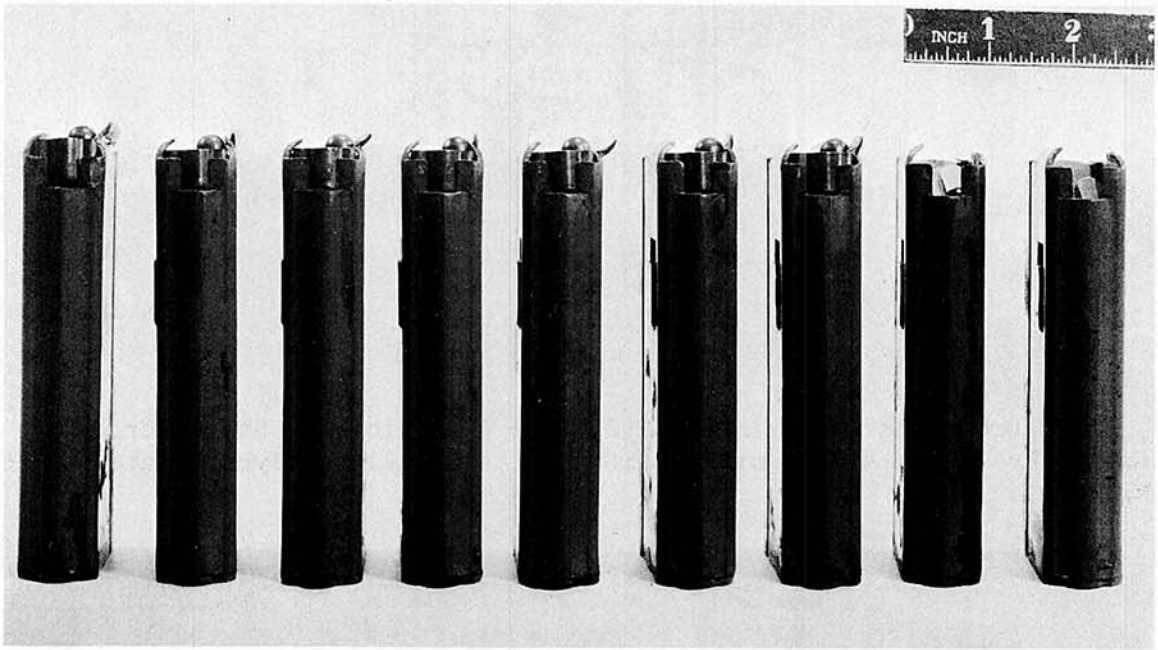

Figure II-3: Type 3 Magazines with Broken Right Feed-Lips. These Failures Occurred during First-Loading and Subsequent Test Functioning.

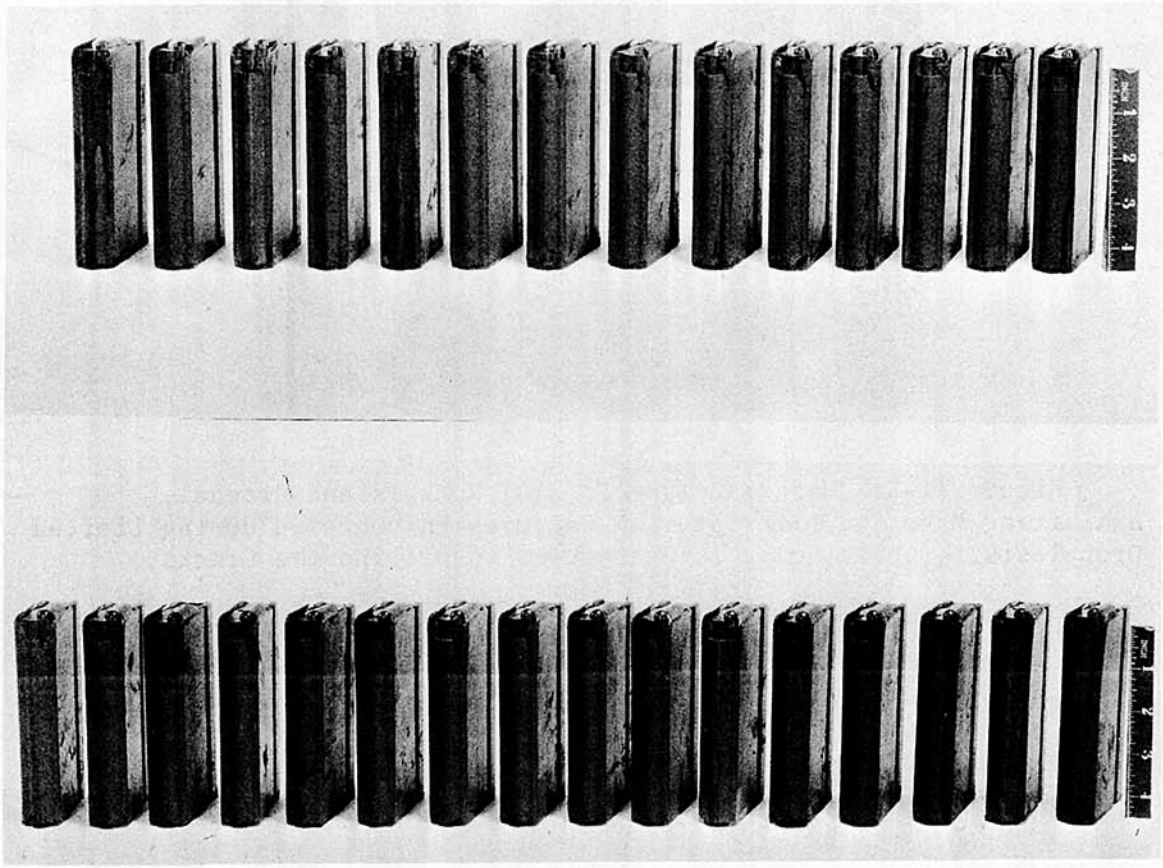

Figure II-4: Type 3 Magazines Exhibiting Varying Degrees of Material Failure. The Black Lines, Starting from the Top Rear of the Magazines, Outline the Path of the Cracks.

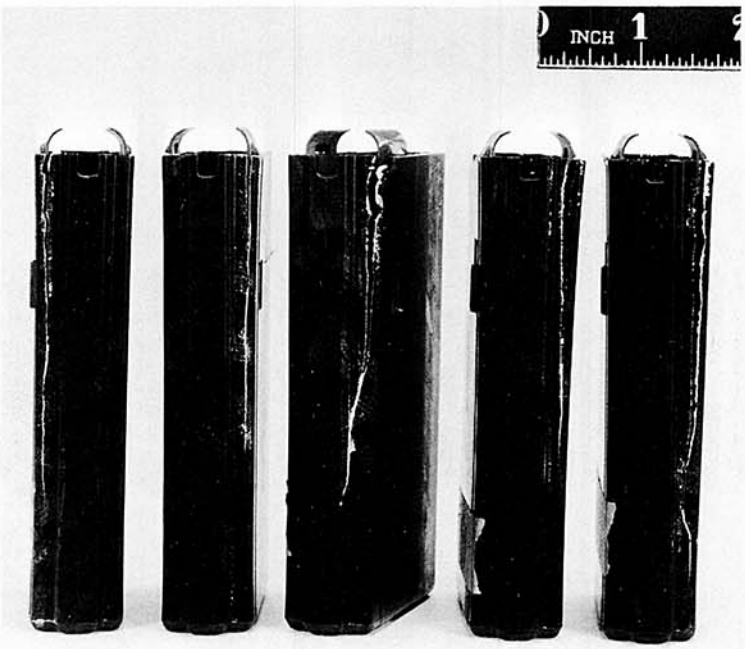

Figure II-5: Magazine Type 5 (RIA) Rock Island Arsenal, Exhibiting Magazine Body Material Failures Encountered during Limited Drop Tests. (White Color is Chalk Used to Outline the Cracks.)

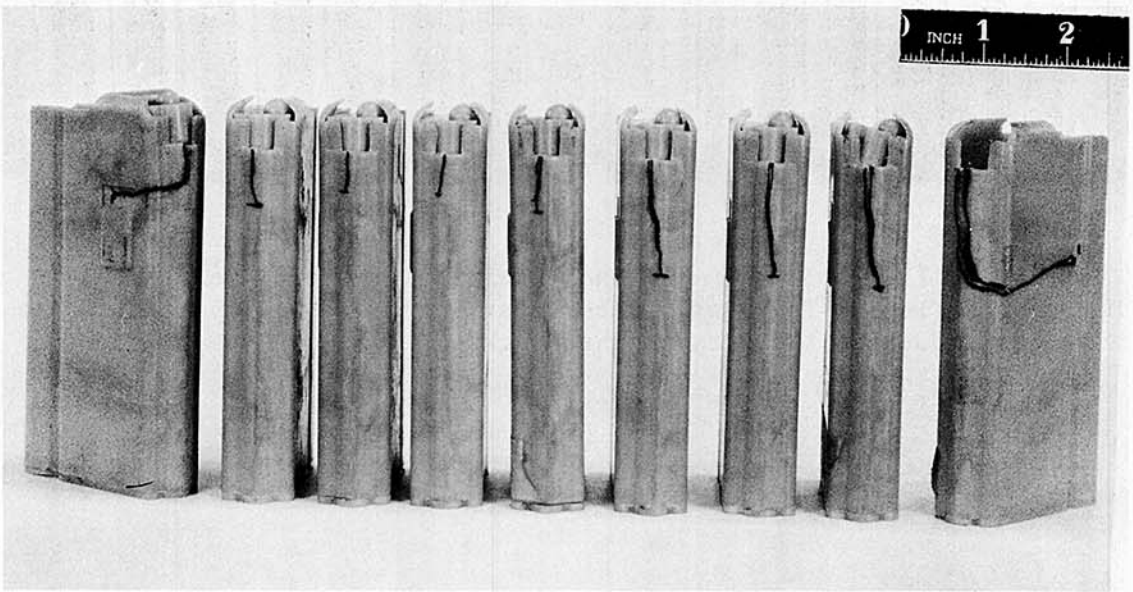

Figure II-6: Magazine Type 7 Exhibiting Material Failures.

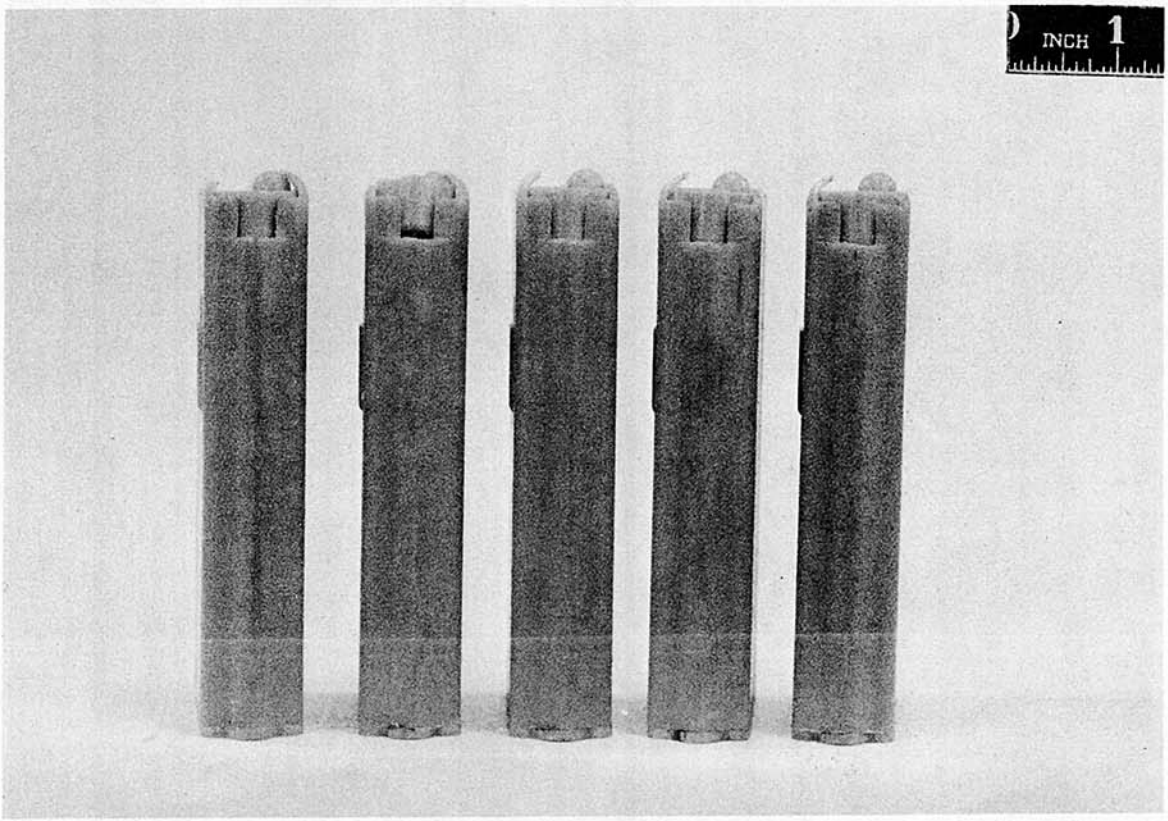

Figure II-7: Magazine Type 7 Exhibiting Material Failures of the Left and Right Feed Lips.

Photographs of the Second EDT Magazines

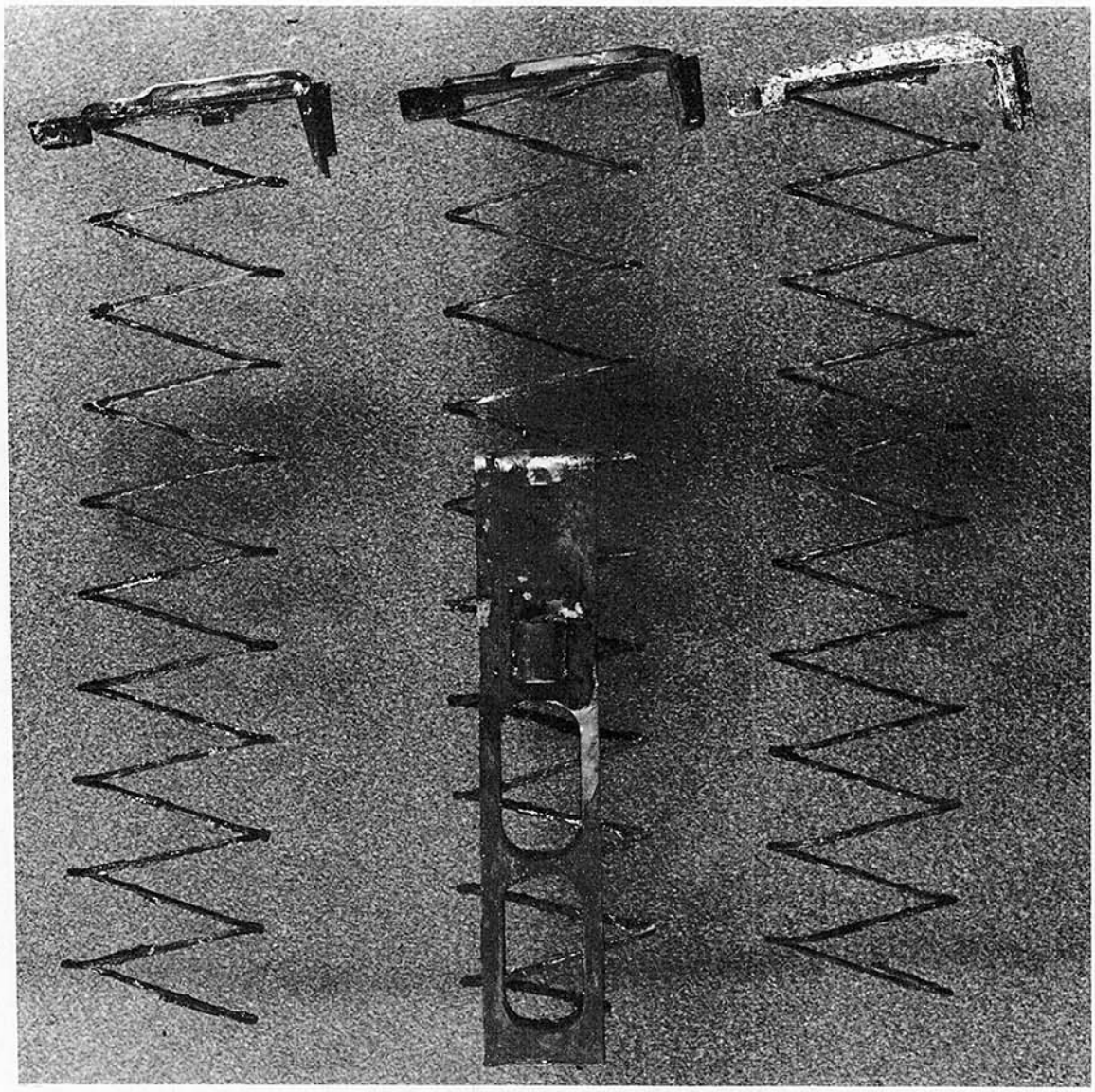

Figure II-8: Results of the Supplementary 10-Day Heat and Humidity Test with Saline-Solution Immersed Components. Rusting of the Follower Springs and Corrosion of the Follower (Control) Is Excessive. Component Types from Left to Right Are: 1-A (LWL), 5-B (RIA), and Control (Colt).

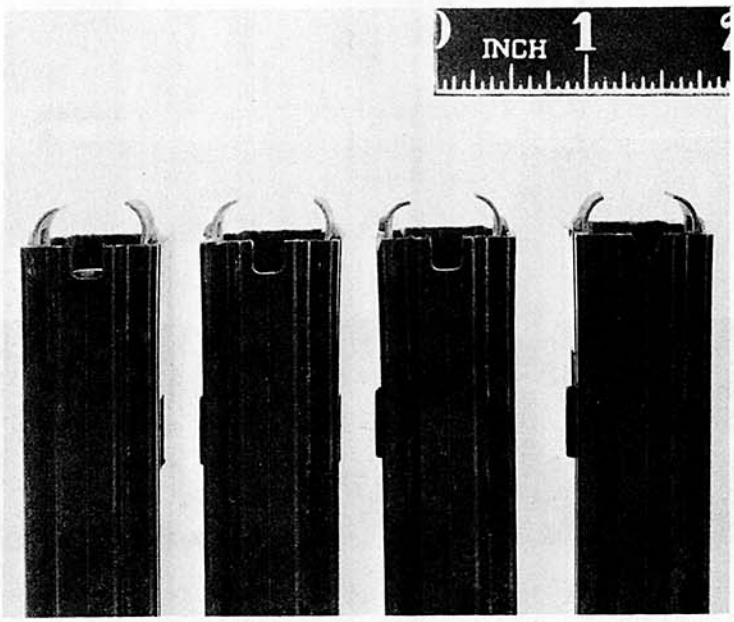

Figure II-9: Distortion of Type 5-B (RIA) Feed-Lips (Three Magazines from Left) and Incomplete Molding of the Bolt-Stop Slot (Right Magazine).

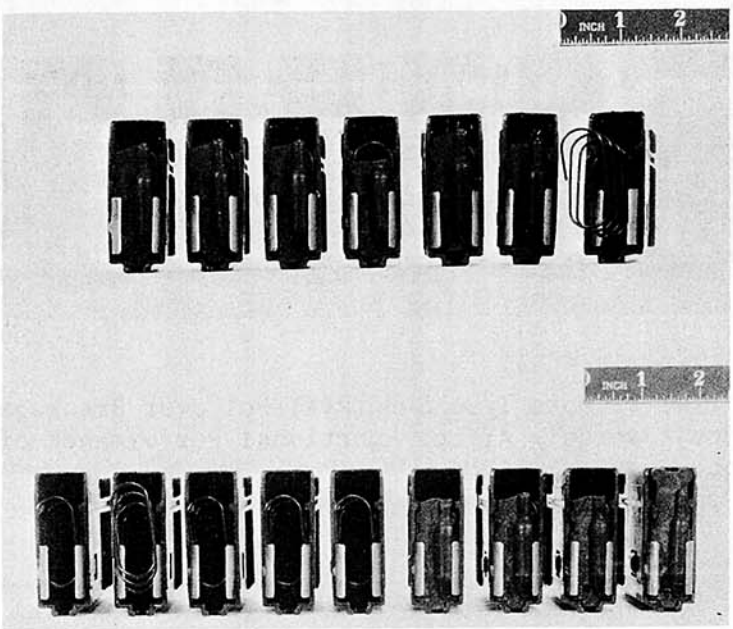

Figure II-10: Magazine Type 5-B (RIA) Exhibiting Broken and Ejected (after Firing of Last Round) Followers Caused during Drop Testing on the Magazine Base in High and Low Temperatures.

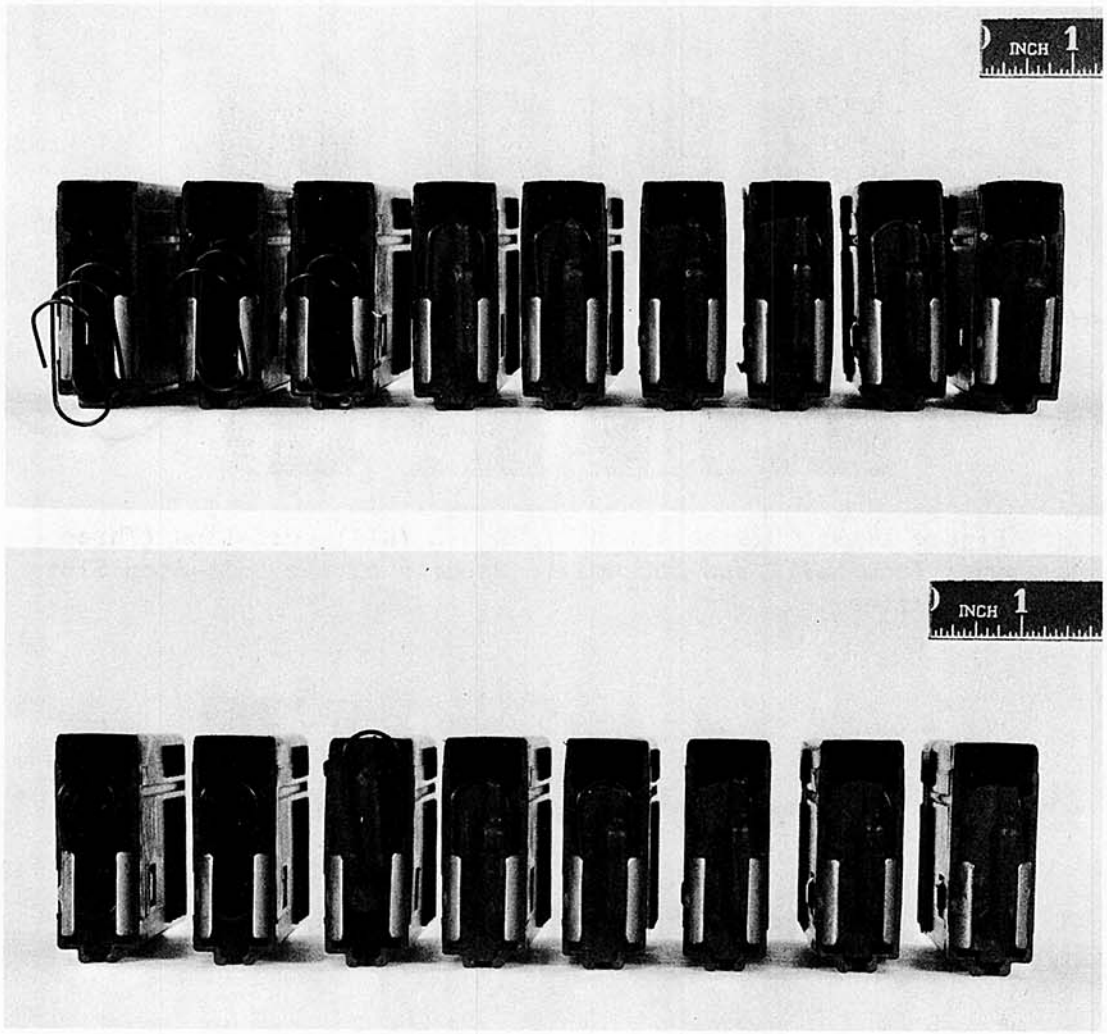

Figure II-11: More Type 5-B (RIA) Follower Breakages. These Breaks Did Not Adversely Affect Functional Performance of the First Magazine Load.

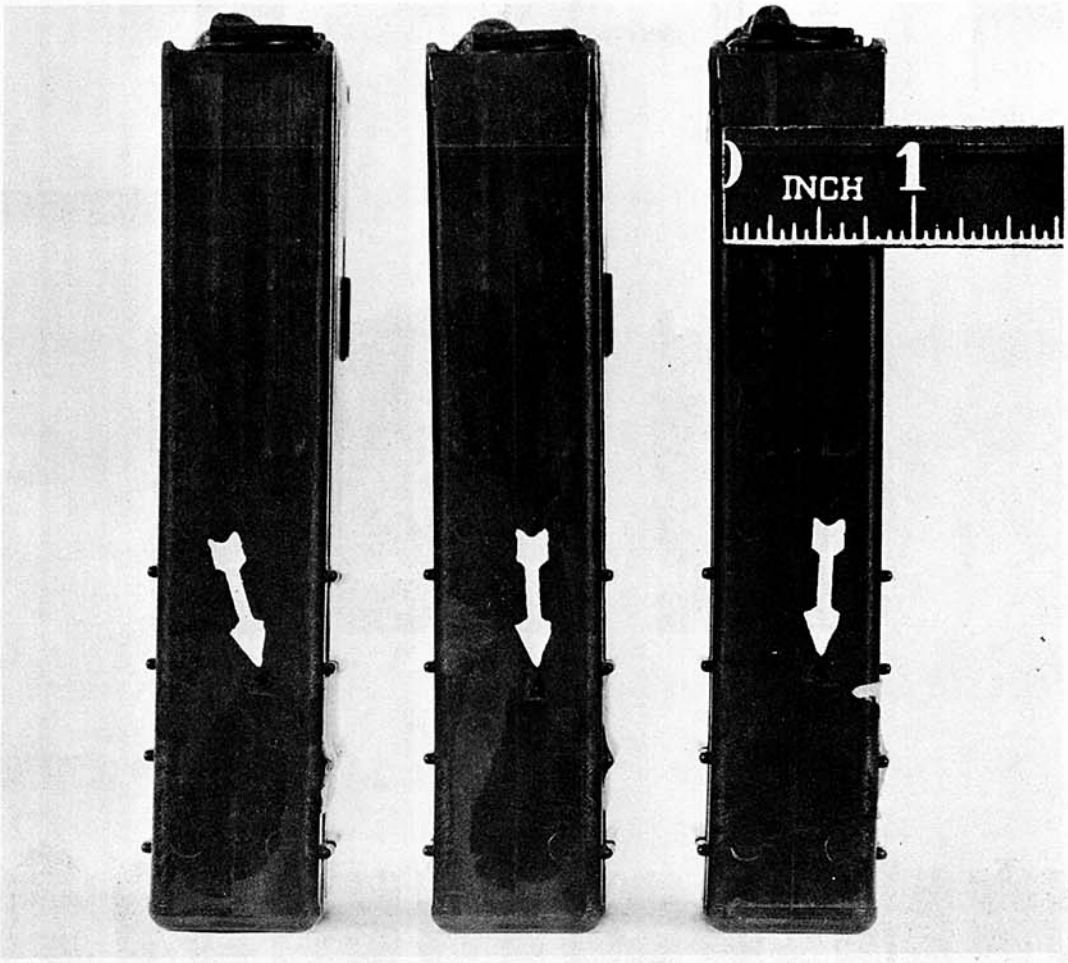

Figure II-12: Magazine Type 5-B (RIA) Exhibiting Frontal Perforation (Base-Dropped Magazines) of 0°F Conditioned Magazines.

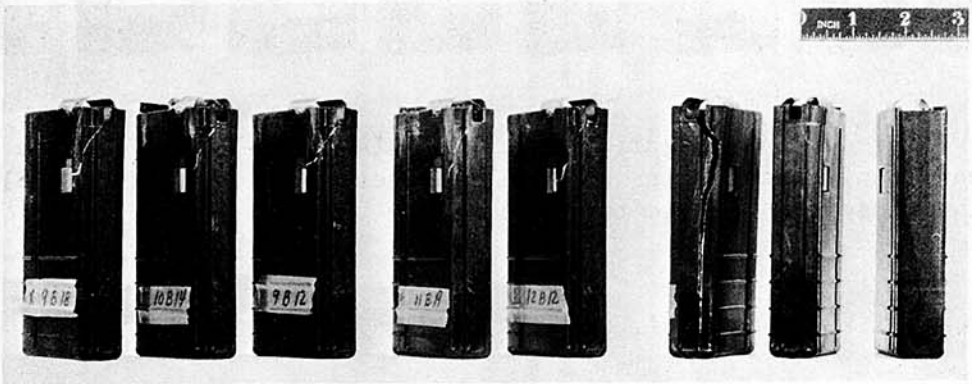

Figure II-13: Magazine Type 5-B (RIA) Drop-Test (Feed-Lip Oriented) Casualties at 0°F. (The White Color Is Chalk Used to Outline the Cracks.)

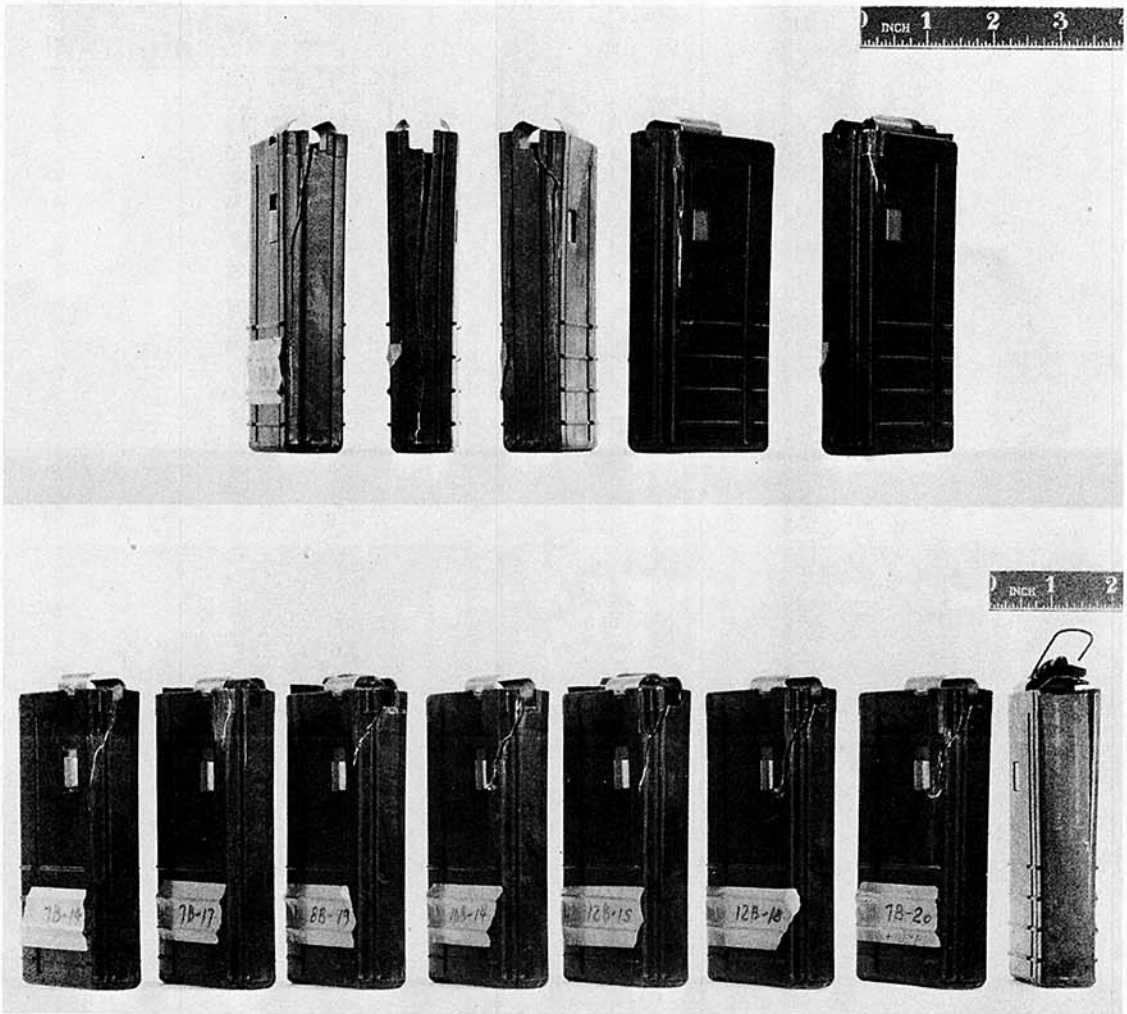

Figure II-14: Magazine Type 5-B (RIA) Drop-Test (Feed-Lip Orientation). Casualties at +155°F Temperature. (The White Color Is Chalk Used to Outline the Cracks.)

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

S - 7 February 1967

AMSTE-BC
8-7-0200-03

20 JAN 1967

SUBJECT: Engineer Design Test of Disposable Magazines for XM16E1 Rifle

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

1. References:

a. Msg, AMSTE-BC, 18518, 21 Oct 66, Subj: Test Directive for ET/ST of Disposable Magazines for XM16E1 Rifles.

b. Ltr, STEAP-DS-TI, 8 Nov 66, Subj: ET/ST of Disposable Magazine for XM16E1 Rifle, USATECOM Project No. 8-7-0200-01.

c. Msg, STEBC-SA, 2 Nov 66, Subj: ET/ST of Disposable Magazines.

d. Mtg, USAWECOM, 26-27 Oct 66 to discuss test planning.

e. Mtg, Hqs, USATECOM, 13 Jan 67 to discuss ED Tests of Disposable Magazine.

2. Upon receipt of an urgent requirement of a disposable magazine for SEA application, the Weapons Command initiated an expedited development program. This program is cited as an ENSURE (Expediting Non-Standard, Urgent Requirements for Equipment) item which carries a SEA priority 01. It is anticipated that four to five prototypes will be delivered for an Engineer Design Test.

3. The objective of this task is to conduct only those tests necessary which will provide a basis for selection of a single prototype for ET/ST with minimum risk.

4. The following materiel and funds will be provided for this task and the ET/ST:

a. Rifles, XM16E1 - 10 (for ED and ET).

b. Ammunition - 40,000 rounds 5.56MM ball (for ED only).
500 rounds 40MM XM387E3 (for ET only).

c. Funds - $40,000 (for ED and ET).

d. Magazines - 150 each prototype.

5. This program is being considered in two phases. Phase One (ED) is to develop a suitable magazine for an immediate limited production buy. Phase Two (ET/ST) magazines will be considered for type classification as Standard A.

6. Prototype Magazines will be delivered on or before 22 March 1967. Testing is to be completed by 7 April 1967 (essential). CO, APG should be prepared to report summary of findings and conclusions by 11 April 1967 at an anticipated meeting. In the event that a meeting is not held, submit teletype report to AMSWE-RDS, info this headquarters, not later than 11 April 1967. Confirmation of the above schedule is requested by 20 February 1967. A firm date is expected at least one week prior to delivery of test items. Any slippage in delivery after 22 March will extend test completion on a day by day basis. This is considered a Category II activity.

7. The test plan outline, reference 1b, is considered adequate for the ED tests subject to the following modifications:

a. Para 2 - Revise the objective and method to add testing of five magazines of each prototype for a total of ten reloadings.

b. Para 3.2, 4.2, 5.2, 6.2 - Delete the reloading requirement.

c. Para 8 - Revise, as necessary, for tests at a lower limit of plus 35°F. This is for the ED phase only. Lower limit of minus 65°F is desired for ET.

d. Para 11 - This command concurs in the use of standard magazines as control. Suggest a minimum of three control magazines be prepared for each subtest to be used as deemed necessary to differentiate between malfunctions attributable to weapon and/or magazines. Also record cyclic rates for each prototype magazine during subtest 2, 7, 8 and 9.

e. Submit five copies of the test plan direct to AMSWE-RDS for comment and/or approval with five information copies to this headquarters.

8. Letter report of test is required within 30 days after completion of test. Distribution is as follows:

AMSTE-BC
8-7-0200-03

20 JAN 1967

SUBJECT: Engineer Design Test of Disposable Magazines for XM16E1 Rifle

a. CG USATECOM, ATTN: AMSTE-BC - 5 cys

b. CG USAWECOM, ATTN: AMSWE-RDS - 15 cys

c. Pres, USAIB, ATTN: STEBC-SA - 1 cy

9. USATECOM Project No. 8-7-0200-03 is assigned.

10. This task is unclassified.

11. The ET plan is required 30 days after completion of this task. The experience gained may dictate methods of future testing and sample size. However, materiel requirements for ET are required by 7 February 1967. For your consideration, 300 magazines is a suggested sample size for planning purposes.

FOR THE COMMANDER:

AUSTIN TRIPLETT, Jr.
Colonel GS
Director, Inf Mat Test

1 Incl
STE Form 1028 w/d

Copies furnished: (w/o incl)
CG, USAWECOM, ATTN: AMSWE-RDS
Pres, USAIB, ATTN: STEBC-SA

COPY/tsp

1967 JAN 24

NNNNVA

DATE: 24 JAN 67
ACTION: COMPT
INFO: D&PS
TEC

CZCAFA844

RFTU JAW RUEOXSDØ161 Ø241142-UUUU--RUEOFAA.

DE RUWPRK 1852K Ø2322Ø4

ZNR UUUUU

R 2322ØØZ JAN 67

FM CO ROCK ISLAND ARSENAL ROCK ISLAND ILL

TO CO APG ABERDEEN MD

BT

UNCLAS RI 1852 TO STEAP-CO-P FROM CLN SWERI-CPF-2324 HOY

1. FUNDS NOT EXCEED DOL 4Ø,ØØØ.ØØ ARE CERTIFIED CHARGEABLE TO 21X4992.663 66 S11-Ø7Ø, AMCMS CODE 5523.11.458Ø1.Ø7, PRON NR. M 5-7-PØØ28-Ø1-M5-K2, TO COVER THE INITIAL FUNDING OF ED AND ETST TESTING ON DISPOSABLE MAGAZINES FOR XM16E1 RIFLE.

2. PROCUREMENT/WORK DIRECTIVE WILL BE FORWARDED UNDER SEPARATE COVER.

BT

COPY/tsp

1967 MAR 15

NNNNCZCAFA544

RTTU JAW RUWJRRA7333 Ø741944-UUUU--RUEOFAA.

ZNR UUUUU

R 1515ØØZ MAR 67

FM CGUSAWECOM ROCK ISLAND ILL

TO RUEOFAA/CO APG ABERDEEN MD

INFO RUEOFAA/CG USATECOM APG ABERDEEN MD

BT

UNCLAS RI 7333 FOR STEAP-DS DOILNEY INFO AMSTE-BC CRIDER FROM AMSWE-RDS

SUBJECT CLN DISPOSABLE MAGAZINE FOR XM16E1 RIFLE

1. MODELS OF SIX MAGAZINES WILL BE HAND CARRIED TO D&PS ON 21 MAR 67. THIS INFORMATION IS PROVIDED SUCH THAT SCHEDULING OF THE TEST TO BEGIN ON 22 MAR 67 AS AGREED, CAN BE ACCOMPLISHED.

2. MR. WARREN WELLS WILL BE THE ROCK ISLAND ARSENAL REPRESENTATIVE AT THESE TESTS.

3. THIS COMMAND CONCURS IN THE PLAN OF TEST AS SUBMITTED WHEN FIRINGS OF THE XM148 GRENADE LAUNCHER ARE INCLUDED.

BT

COPY/tsp

CZCAFA699

RTTU JAW RUWJRRA95Ø4 Ø941733-UUUU--RUEOFAA.

ZNR UUUUU

R Ø417152 APR 67

FM CGUSAWECOM ROCK ISLAND ILL

TO RUEOHFA/CGUSAMC

RUEPDA/OCRD DA WASHDC

RUEPDA/ACSFOR DA THE PENTAGON WASHDC

RUEOADA/CGUSAMUCOM DOVER NJ

RUEOFAA/CGUSATECOM ABERDEEN MD

RUEOPUA/COFA PHILA

RUCIRNA/CO SPRINGFIELD ARMORY SPRINGFIELD MASS

RUEOFAA/CO LWL APG MD

RUEOFAA/CO APG MD

RUCLBRA/CO USACDCIA FT BENNING GA

RUCIHOA/CO USMC WASHDC

RUCLBMA/CO EGLIN AFB FLA

RUEDJUA/CO WEAPON PRODUCTIONENGR CENTER CRANE IND

RUCIJMA/DIRECTOR LANDING FORCE DEVELOPMENT CENTER QUANTICO VA

BT

DATE: 5 Apr 67
ACTION: LWL
ACTION: D&PS
INFO: INTELL
MOO
CONTROL

UNCLAS RI 95Ø4 FOR AMCRD-WI, CRD/D, ACSFOR LT. COM. HOGAN, AMSMU-RE-M, AMSTE-BC, SMUFA-19ØØ, SWESP-RE, CRD-AM-6B, STEAP-DS-TI, CAGIN-CM, USMC CMU, DAD RTD ATWG, USNAD, MAJOR J. W. GOAR

COPY/tsp

PAGE 2 RUWJRRA95Ø4 UNCLAS

SUBJECT CLN DISPOSABLE MAGAZINE FOR M16 AND M16A1 RIFLES

1. MEETING TO REVIEW RESULTS OF ED TEST OF SUBJECT MAGAZINE IS SCHEDULED FOR 11 AND 12 APRIL 1967. MEETING WILL BE HELD AT APG, BUILDING 4ØØ COMMENCING AT 13ØØ HOURS.

2. PURPOSE OF MEETING IS TO DETERMINE THE FEASIBILITY OF DISPOSABLE MAGAZINES AND SUITABILITY OF CONCEPTS TESTED TO FILL THE SEA REQUIREMENT.

3. CONFIDENTIAL SECURITY CLEARANCE REQUIRED.

4. SECURITY CLEARANCES SHOULD BE FORWARDED TO CO, APG, ATTN CLN STEAP-IN.

5. MR. S. DOILNEY, STEAP-DS EXTENSION 4489 IS APG CONTACT.

BT

COPY/tsp

M

ROUTINE
ROUTINE

1967 MAY 26

COABERDEENPG MD

CGUSAWECOM ROCK ISLAND ILL

INFO: CGUSATECOM APD MD

UNCLAS 6016 FOR AMSWE-RDS; AMSTE-BC FROM STEAP-DS-TI SGD MILLER AND BROWN

SUBJ: UTILIZATION OF FUNDS

REF: DISPOSABLE MAGAZINE COMMITTEE MEETING, 11-12 APR 67, USATECOM PROJ NO. 8-7-0020-01, 03.

1. AT THE REFERENCED MEETING DECISION WAS MADE TO CONDUCT A SECOND ED TEST AT APG OF TWO MAGAZINE TYPES (LWL AND RIA). TESTING WAS TO BE INITIATED ON OR ABOUT 1 JUNE 1967. TO DATE WRITTEN CONFIRMATION OF THIS REQUIREMENT HAS NOT BEEN RECEIVED.

2. IN ORDER TO CONDUCT THE SECOND ED TEST, FUNDS AT APG ORIGINALLY INTENDED TO COVER THE ENGINEER TEST WILL BE UTILIZED. REQUEST AUTHORIZATION BE FURNISHED FOR USE OF THE ET FUNDS.

3. UPON COMPLETION OF ED TEST, COST, MATERIEL, AND TIME ESTIMATE FOR ET REQUIREMENTS CAN BE FURNISHED.

MAY 67

1 1

S. A. DOILNEY 4489
Chief, Small Arms and Aircraft Weapons

CLAUDE E. BROWN, Chief, Infantry and Aircraft Weapons Division

UNCL NA

COPY/tsp

NNNNQZCAFA9Ø9

RTTU JAW RUCIRRA5783 153195Ø-UUUU--RUEOFAA.

ZNR UUUUU

R Ø219ØØZ JUN 67

DATE: 5 June 67
ACTION: Compt
ACTION: D&PS
INFO: LWL

FM CO ROCK ISLAND ARSENAL ROCK ISLAND ILL

TO CGUSATECOM ABERDEEN PROVING GROUND ABERDEEN MD

BT

UNCLAS RI 15783 FOR STEAP-DS-TI, SGD MILLER AND BROWN FROM SWERI-RDD-FW-MELOW.

SUBJ CLN UTILIZATION OF FUNDS

REF CLN TT APG 6Ø16 2618572

1. AUTHORIZATION IS GRANTED TO UTILIZE FUNDS NOW AT ABERDEEN PROVING GROUND ON USA TECOM PROJECT NO. 8-7-Ø2ØØ-Ø1, Ø3, TO CONDUCT SECOND ED TEST ON TWO DISPOSABLE MAGAZINES, TYPES (LWL AND RIA).

2. UPON COMPLETION OF SECOND ED TEST, REQUEST COST, MATERIAL AND TIME ESTIMATE FOR ET REQUIREMENTS.

3. JOB ORDER FROM THIS OFFICE WILL BE MODIFIED TO REFLECT CHANGE IN SCOPE.

BT

APPENDIX IV - REFERENCE

1. TECP 700-700, Interim Pamphlet 20-20, 11 April 1966.

APPENDIX V - DISTRIBUTION LIST

USATECOM Project No. 8-7-0200-03

ADDRESSEE	FINAL REPORT
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Commanding General US Army Test and Evaluation Command Aberdeen Proving Ground, Md. 21005 ATTN: AMSTE-BC AMSTE-TA	1 1
Commanding General US Army Combat Developments Command Aberdeen Proving Ground, Md. 21005 ATTN: USACDC LnO, USATECOM	10
Commanding General US Army Weapons Command Rock Island Arsenal Rock Island, Illinois 61202 ATTN: AMSWE-RDS	10
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Development and Proof Services, Aberdeen Proving Ground, Maryland
Final Report on USATECOM Project No. 8-7-0200-03, Engineer Design Test of Magazine, 20-Round, Disposable, for M16A1 (XM16E1) Rifle, October 1967
AMCMS Code No. 5523.11.45801.07, Report No. DPS-2536
Author Franklin H. Miller
Secondary distribution controlled by US Army Weapons Command, AMSWE-RDS
85 pages, 21 illustrations

Unclassified Report

Nine different disposable magazine types were tested at Aberdeen Proving Ground, Maryland for the purpose of selecting the type most functionally suitable for use in the M16A1 (XM16E1) rifle. Tests were conducted from 22 March 1967 to 24 August 1967. The various magazines were tested for functional reliability and material durability while being subjected to temperatures of +155°F, and -65°F for thermal testing and ambient (+70°F ± 30°F) for function and durability tests. Adverse conditions (sand, mud, and dust), heat and humidity, and chemical compatability tests were also conducted. The two magazine types selected from the first engineer-design test, and subsequently modified and retested, still exhibit undesirable (although correctable) characteristics which should be ameliorated prior to acceptance of the designs.

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Unclassified

Security Classification

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

ENGINEER DESIGN TEST OF MAGAZINE, 20-ROUND, DISPOSABLE, FOR M16A1 (XM16E1) RIFLE

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

Final Report 22 March to 24 August 1967

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

Miller, Franklin H.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
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8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
Not Applicable	
b. PROJECT NO. USATECOM Project No. 8-7-0200-03	DPS-2536
c.	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*
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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
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13. ABSTRACT

Nine different disposable magazine types were tested at Aberdeen Proving Ground, Maryland, for the purpose of selecting the type most functionally suitable for use in the M16A1 (XM16E1) rifle. Tests were conducted from 22 March 1967 to 24 August 1967. The various magazines were tested for functional reliability and material durability while being subjected to temperatures of +155°F, 0°F, and -65°F for thermal testing and ambient (+70°F ± 30°F) for function and durability tests. Adverse conditions (sand, mud, and dust), heat and humidity, and chemical compatibility tests were also conducted. The two magazine types selected from the first engineer-design test, and subsequently modified and retested, still exhibit undesirable (althouth correctable) characteristics which should be ameliorated prior to acceptance of the designs.

DD FORM 1 JAN 64 1473

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14. KEY WORDS	LINK A		LINK B		LINK C	
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USATECOM PROJECT NO. 8-7-0200-03

FINAL REPORT ON ENGINEER DESIGN TEST

OF MAGAZINE, 20-ROUND, DISPOSABLE,

FOR M16A1 (XM16E1) RIFLE

Report No. DPS-2536

CODE SHEET

Code A - General Electric Co., Inc. (LEXAN)

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