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RDTE PROJECT NO/FSN_____

USATECOM PROJECT NO 8-WE-620-015-002

USAIB PROJECT NO 3325

USACDC AC NO 7571V

CHECK TEST OF

BLANK FIRING ATTACHMENT, XM15E1, FOR M16A1 RIFLE

FINAL REPORT

By

MAJOR WILLIAM L. SHACKELFORD

January 1971

UNITED STATES ARMY INFANTRY BOARD
Fort Benning, Georgia 31905

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ABSTRACT

The Check Test of the Blank Firing Attachment (BFA), XM15E1, was conducted by the US Army Infantry Board from 1 December 1970 to 4 January 1971 at Fort Benning, Georgia. The purpose of the test was to determine whether the deficiency and shortcoming found during the service test had been corrected and to determine whether the XM15E1 BFA with M200 blank cartridge was suitable for US Army use.

Specific phases of testing under existing ambient conditions included preoperational inspection and physical characteristics, safety, adequacy of simulation, reliability and durability, maintenance, operational suitability, human factors, and value engineering. Nine BFA's and 31,000 rounds of M200 blank cartridges were used in the conduct of the test.

No deficiencies were found. The previous deficiency, excessive build-up of firing residue in the bolt carrier key and gas tube of the M16A1 rifle, found in the XM15 service test, had been corrected. The previously reported shortcoming concerning the high incidence of stoppages due to the short length of the M200 blank cartridge continued to exist (.008); however, the percentage of occurrence was within the limits specified by the user (.03). The malfunction rate exhibited by one of the nine M16A1 rifles (rifle No 2, .060) was deducted from the final analysis because it was abnormal as compared to the other rifles. The eight remaining test blank firing systems had a total malfunction rate of .026 as compared to that of the BFA for the M14 rifle (.019, Service Test of the XM15 BFA, June 1968). In arriving at the chargeable malfunction rate, the "stubbing" rate of the eight rifles was deducted (.008). This gave a malfunction rate of .018, which was comparable to that of the M14 rifle. The XM15E1 BFA was considered durable and reliable.

It was concluded that the Blank Firing Attachment, XM15E1, with M200 blank cartridge, was suitable for US Army use.

FOREWORD

The United States Army Infantry Board was responsible for preparing the test plan, test execution, and preparing the test report.

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SECTION 1. SUMMARY

1.1 BACKGROUND

1.1.1 The adoption of the M16A1 rifle created a requirement for a 5.56-mm blank cartridge and blank firing attachment for training purposes. The Cartridge, 5.56-mm, Blank, XM200 (XM200), was developed under the technical direction of Frankford Arsenal. The Blank Firing Attachment, XM15 (XM15), was developed by Springfield Armory. The US Army Infantry Board (USAIB) conducted a service test of the XM15 and the XM200 blank cartridge from 3 April 1968 to 6 May 1968 to determine whether the XM15 and XM200 were suitable for use with the M16A1 rifle. One deficiency and one shortcoming were found. The deficiency was an excessive buildup of firing residue in the bolt carrier key and gas tube that rendered the M16A1 inoperative. The shortcoming was the shorter length of the test cartridge which contributed to the high incidence of stoppages wherein the tip of the test cartridge caught on the lip of the magazine or on the outer edge of the chamber. USAIB concluded that the XM15 and the XM200 were not suitable for use with the M16A1 rifle (ref 2, app IV). The cartridge was type classified Standard A as a separate item on 17 April 1968. Tests by Frankford Arsenal in February 1970 indicated that the fouling problem was caused by residue from the cartridge sealant. Substitution of an inorganic-type sealant apparently corrected the problem. On 12 March 1970 representatives of Project Manager Rifles, United States Continental Army Command, United States Combat Developments Command, United States Marine Corps, United States Army Infantry School, and the United States Army Infantry Board, met at Fort Benning, Georgia, to discuss the interface between the user requirements and technical/mechanical problems related to the blank firing attachment. As a result of this meeting the user, rather than state a requirement for a special magazine to be used with blank ammunition, accepted a 3-percent stubbing rate. In 1970 the US Army Weapons Command (USAWECOM) selected one of several competitive blank firing attachment (BFA) designs and requested that the US Army Test and Evaluation Command (USATECOM) conduct suitability testing. This BFA has been designated as the XM15E1 (XM15E1).

1.1.2 On 27 October 1970 USATECOM issued a test directive that USAIB conduct a check test of the XM15E1. Aberdeen Proving Ground began the engineering-type check test in January 1971.

1.1.3 The safety release was issued by USATECOM on 20 November 1970.

1.1.4 Materiel for testing was delivered to USAIB on 26 November 1970.

1.2 DESCRIPTION OF MATERIEL (see fig 1, app I)

1.2.1 The BFA, XM15E1, hereinafter called the test item or BFA, uses low carbon steel for the body and a free machining stainless steel for the restrictor tube. The BFA attaches to the flash hider. The restrictor

tube screws flush with the muzzle face in order to secure the BFA to the rifle. A hole in the center of the restrictor tube controls the gas pressure which causes weapon functioning.

1.2.2 When referred to collectively the test cartridge, the test BFA, and the M16A1 will be referred to as the test blank firing system.

1.3 TEST OBJECTIVES

1.3.1 To determine whether the deficiency and shortcoming found during the service test had been corrected.

1.3.2 To determine whether the XM15E1 BFA with M200 Blank Cartridge was suitable for US Army use.

1.4 SCOPE

1.4.1 This check test was conducted at Fort Benning, Georgia, under prevailing ambient temperature conditions from 1 December 1970 to 4 January 1971.

1.4.2 The following subtests were conducted and are referenced to the subtest in the previous service test (ref 2, app IV). Subtest No 4, Ease of Loading and Charging, of the service test was not applicable since there had been no change in cartridge length or magazine.

a. Subtest No 1, Preoperational Inspection and Physical Characteristics (Subtest No 1, ref 2, app IV).

b. Subtest No 2, Safety (Subtest No 2, ref 2, app IV).

c. Subtest No 3, Adequacy of Simulation (Subtest No 3, ref 2, app IV).

d. Subtest No 4, Reliability and Durability (Subtest No 5, ref 2, app IV).

e. Subtest No 5, Maintenance (Subtest No 6, ref 2, app IV).

f. Subtest No 6, Operational Suitability (Subtest No 7, ref 2, app IV).

g. Subtest No 7, Human Factors (Subtest No 8, ref 2, app IV).

h. Subtest No 8, Value Engineering (not conducted in service test).

1.4.3 Test soldiers used in this test were representative of those expected to use and maintain the test item in the field.

1.4.4 Nine M16A1 rifles with closed end, 4-vent, flash suppressors were used with the BFA. These nine rifles fired a total of 31,000 rounds of improved M200 blank cartridges. Twenty-round magazines were used. One M16A1 rifle, used for maintenance comparison purposes, fired 5,000 rounds of ball ammunition exclusively.

1.4.5 Throughout all firing exercises M16A1's with test items were fired semiautomatically at the maximum effective rate of 40 rounds per minute and an automatic maximum effective rate of 60 rounds per minute. After each 100-round firing sequence the barrel was cooled to the point that it could be held by the bare hand.

1.4.6 Weapon malfunctions were recorded and analyzed.

1.4.7 Results of this test were compared to the results of the previous service test of the BFA. The suitability of the test BFA was determined by satisfying Draft Characteristics and USAIB criteria (app II), and by correction of the deficiency reported in the service test.

1.5 SUMMARY OF RESULTS

1.5.1 No deficiencies were noted.

1.5.2 The shortcoming concerning the shortness of the M200 blank cartridge and the resultant "stubbing" of the cartridge on the magazine and rifle chamber continues to exist. During the test the stubbing rate was .8 percent of the total rounds fired; which is less than the user maximum acceptable limit of 3 percent.

1.5.3 The test items were complete and operational.

1.5.4 The test item was considered safe for US Army use.

1.5.5 The test blank firing system did not duplicate the signature effects of the M193 cartridge; however, it reasonably simulated the firing of the M16A1 rifle with the M193 cartridge.

1.5.6 A total of 5,000 blank rounds was fired through each of two XM15E1 BFA's and 3,000 rounds were fired through each of seven BFA's. The malfunction rate exhibited by one of the nine M16A1 rifles (rifle No 2, .060) was deducted from the final analysis because it was abnormal as compared to the other rifles. The eight remaining test blank firing systems had a total malfunction rate of .026 as compared to that of the BFA for the M14 rifle (.019, Service Test of the XM15 BFA, June 1968). Strict quantitative comparative analysis was not appropriate due to the differences in ammunition configuration and rifle characteristics. The user had previously agreed to accept a .030 "stubbing" rate associated with a BFA for the M16A1 rifle. During this check test the "stubbing" rate was .008. Consequently, the total malfunction rate for this check test was reduced from .026 by .008 to .018. The XM15E1 was considered sufficiently durable and reliable.

1.5.7 No maintenance difficulties were experienced during testing. The 9 M16A1 rifles through which the 31,000 rounds of M200 blank ammunition were fired did not clog. There were no differences in maintenance performed or required for rifles that fired blank ammunition as opposed to rifles that fired ball ammunition.

1.5.8 The test blank firing system was considered sufficiently realistic during tactical exercises.

1.5.9 No undesirable features concerning human factors were noted.

1.6 CONCLUSIONS

The US Army Infantry Board concludes that:

a. The Blank Firing Attachment, XM15E1, with M200 Blank Cartridge, is suitable for US Army use.

b. The deficiency found during the service test had been corrected.

c. The shortcoming found during the service test had not been corrected; however, the shortcoming was within acceptable user limits.

1.7 RECOMMENDATION

None.

SECTION 2. DETAILS OF TEST

2.1 SUBTEST NO 1, PREOPERATIONAL INSPECTION AND PHYSICAL CHARACTERISTICS

2.1.1 Objective

To insure that the test items were complete and in proper condition for testing, and to determine their size, configuration, and weight.

2.1.2 Criteria

2.1.2.1 "(Essential) Weight of eight ounces or less." (Ref item 1, app II)

2.1.2.2 "(Essential) Easily attached to and removed from the weapon without disassembly of the weapon." (Ref item 2, app II)

2.1.2.3 "(Essential) Permit use with bipod attached." (Ref item 3, app II)

2.1.2.4 "(Desirable) The bayonet can be attached to the M16A1 rifle fit with the BFA." (Ref item 12, app II)

2.1.2.5 "(Desirable) There will be adequate clearance between the M203 grenade launcher muzzle and the BFA." (Ref item 13, app II)

2.1.3 Method

2.1.3.1 The test items were visually examined, manually operated, weighed, measured, and photographed. Photographs were made of the test item attached to the M16A1 and of the M16A1 with the M203 grenade launcher attached.

2.1.3.2 Each of the test items was attached to and removed from each of ten M16A1's (one time each).

2.1.3.3 The test item was attached to the M16A1, with bipod, and a determination was made as to whether the attached test item restricted the use of the bipod (one time).

2.1.3.4 An attempt was made to attach the bayonet to ten M16A1's with BFA attached (one time).

2.1.3.5 Clearance was measured between the muzzle of the M203 grenade launcher and the lowest protruding portion of the test item.

2.1.4 Results

2.1.4.1 The test items were determined to be complete and operational. (See fig 1 and 2, app I)

2.1.4.2 The average size of the test item was 1 1/2 inches long, 1 inch wide, and 1 1/2 inches high. The restrictor tube was 2 1/4 inches long. (See fig 2, app I)

2.1.4.3 The average weight of the test item was 2.56 ounces.

2.1.4.4 The test item was easily attached to and detached from the M16A1 rifle.

2.1.4.5 The bayonet and test item were compatible with the M16A1 rifle. The bayonet must be attached to the rifle prior to attachment of the test item on the barrel flash suppressor. Removal of the bayonet required prior removal of the test item. (See fig 3, app I) The bayonet scabbard would not fully cover the bayonet blade when the test item was attached to the M16A1 rifle. The scabbard was secure on the bayonet blade when the scabbard straps were strapped together. (See fig 4, app I)

2.1.4.6 Muzzle clearance between the M203 grenade launcher and the test item was 11/16 of an inch. (See fig 5, app I)

2.1.4.7 No difficulty existed in attaching the bipod to, or removing the bipod from, the M16A1 rifle with attached test item.

2.1.5 Analysis

The test items were complete and meet the criteria for size, configuration, and weight.

2.2 SUBTEST NO 2, SAFETY

2.2.1 Objective

To determine whether the test item was safe for US Army use.

2.2.2 Criteria

2.2.2.1 "(Essential) The test item will be designed to prevent injury to using personnel." (Ref item 14, app II)

2.2.2.2 "(Essential) The test item will be of a conspicuous color (to provide constant recognition that the attachment is on the weapon, thus minimizing inadvertent firing of live ammunition with the BFA attached)." (Ref item 4, app II)

2.2.2.3 "(Essential) Must attach securely to the weapon to preclude propulsion down range should it be accidently loosened." (Ref item 5, app II)

2.2.3 Method

2.2.3.1 The safety release was reviewed to determine whether it placed undue restrictions on the use of the test item.

2.2.3.2 Throughout all testing, safety hazards noted in the use of the test item were recorded and photographs taken as required.

2.2.3.3 Test soldiers were questioned by test personnel to determine whether the test item could be identified visually and by touch.

2.2.3.4 Throughout testing each test item was inspected to determine whether any looseness occurred during firing. One test item was deliberately loosened to determine if it could be propelled down range.

2.2.3.5 A paper perforation test was fired at distances of 6, 12, 24, and 30 inches (distance between BFA and paper) to determine the distance at which firing residue penetrated the paper.

2.2.4 Results

2.2.4.1 The safety release placed no undue restrictions on the use of the test item.

2.2.4.2 No safety hazards were discovered during testing. No injuries were experienced.

2.2.4.3 The ten test soldiers easily identified the test item visually and by touch. All ten test soldiers stated that the conspicuous color and configuration of the test item provided ease of recognition. It was the opinion of the test soldiers that this minimized inadvertent firing of ball ammunition through a rifle with the BFA attached.

2.2.4.4 One of the nine test items became loose twice during firing. Looseness occurred after 200 rounds had been fired and again after 2080 rounds had been fired. The looseness was corrected by tightening in both cases. Daily firing was completed without a recurrence.

2.2.4.5 The test item that was loosened purposely fell to the ground under the rifle during the firing of 60 rounds and was not propelled down range.

2.2.4.6 Results of the paper perforation test revealed that residue from the M200 blank cartridge perforated kraft paper at distances up to 24 inches to the side of the test item (opposite the restrictor tube orifice). No perforation occurred at a distance of 30 inches to the side of the test item. No perforation at any distance occurred to the front of the test item. (See fig 6, app I)

2.2.5 Analysis

The test item is safe for US Army use providing no one is closer than 30 inches to either side of the rifle muzzle when the test blank firing system is fired.

2.3 SUBTEST NO 3, ADEQUACY OF SIMULATION

2.3.1 Objective

To determine the adequacy of the test blank firing system to simulate the sound, smoke, and flash produced by the M193 cartridge with the M16A1 rifle.

2.3.2 Criterion

"(Desirable) The test item and M200 blank cartridge will simulate as near as possible the sound, smoke, and flash produced by the M193 cartridge with the M16A1 rifle." (Ref item 15, app II)

2.3.3 Method

2.3.3.1 Two observers, one with 6x30 binoculars, noted and observed the sound, smoke, and flash from observation and listening posts located at 100, 200, 300, 400, and 460 meters to the left front of the firing points. One M16A1 rifle with BFA and M200 blank ammunition and one M16A1 rifle with M193 ball ammunition were fired in the semiautomatic and automatic modes. The two observers attempted to determine any difference in the smoke, sound, and flash without knowledge of which of the two weapons was firing ball or blank ammunition. This exercise was conducted once in daylight conditions and once during the hours of darkness.

2.3.3.2 The difference in firing sounds of the two weapons was recorded. Readings were recorded at the weapon location by an octave band analyzer. The two observers aurally attempted to determine any difference.

2.3.3.3 In addition to observer sightings, the flash of the two weapons was recorded on photographic film.

2.3.3.4 The two observers attempted visually to determine any difference in smoke-signature effect.

2.3.4 Results

2.3.4.1 The signature effects of sound, smoke, and flash produced by the test blank firing system were generally less than the effects produced by the M16A1 rifle and ball ammunition.

2.3.4.2 The test soldiers noted that the sound of the test blank firing system was less than the sound of ball ammunition firing at all ranges. At 460 meters the sound of the test blank firing system was similar to the sound of a nail being hammered into wood. The octave band analyzer used to measure muzzle blast did not have the capability to accurately measure high rise impulse noises. It did, however, detect and record the sound level of ball ammunition firing as being louder than the sound of fired blank ammunition.

2.3.4.3 Smoke from the test blank firing system and the ball ammunition were not visible during night conditions. The following results pertain to firing under day conditions. The two observers noted a heavier smoke-signature effect from the test blank firing system at 100 meters than observed from ball ammunition. At 200 meters ball ammunition smoke signature was slightly more visible than smoke from the test blank firing system. From 300 meters to 460 meters the smoke from the test blank firing system was not visible and ball ammunition smoke was only slightly visible to observers using binoculars.

2.3.4.4 Flash from the test blank firing system and ball ammunition was not visible during daylight at any range. The following results pertain to firing under night conditions. The flash produced by the test blank firing system in the semiautomatic mode could not be seen consistently at any range during night. When seen, the test blank firing system generally produced a flash of less intensity than the M16A1 rifle and ball ammunition. More flash was observed in the automatic mode for both the test blank firing system and the ball ammunition system. When fired at 100 meters in the semiautomatic mode, the test blank firing system could be seen by the unaided eye approximately 50 percent of the time. The flash of ball ammunition, fired in the semiautomatic mode, could be seen all of the time when viewed by the unaided eye from 100 meters. The flash of the test blank firing system could be seen all of the time at 100 meters in the semiautomatic mode when viewed with binoculars. At 100 meters all firing flashes in the automatic mode of both the test blank firing system and ball ammunition could easily be seen with the unaided eye. At 200 meters in the semiautomatic mode, the test blank firing system and the ball ammunition system could not be seen without the use of binoculars. In the automatic mode at 200 meters only the test blank firing system could be seen by the unaided eye. From 300 meters to 460 meters the ball and blank firing flashes were visible only through binoculars. Ball ammunition flashes were of slightly greater intensity from 300 to 460 meters.

2.3.4.5 A comparison of muzzle flash of the test blank firing system and ball ammunition firing is shown in figure 7, appendix I. A close-up front view showing the flash of the test blank firing system is shown in figure 8, appendix I.

2.3.5 Analysis

The test blank firing system does not duplicate the amount of smoke, muzzle flash, or sound produced by the M193 cartridge with the M16A1 rifle; however, the test blank firing system adequately simulates the M193 cartridge with the M16A1 rifle.

2.4 SUBTEST NO 4, RELIABILITY AND DURABILITY

2.4.1 Objective

To determine whether the test item used with M200 blank cartridge and M16A1 rifle was sufficiently reliable and durable.

2.4.2 Criteria

2.4.2.1 "(Essential) Durability and reliability (of the test item with M200 blank cartridge and M16A1 rifle) equal to or greater than the BFA of the M14 rifle (with M82 Blank Cartridge)." (Ref item 6, app II)

2.4.2.2 "(Essential) The test item will possess the durability to withstand 5000 rounds of firing." (Ref item 21, app II)

2.4.2.3 "(Essential) The test blank firing system will be sufficiently reliable to withstand a minimum of 3000 rounds of blank ammunition firing without clogging of the rifle gas system." (Ref item 18, app II)

2.4.2.4 "(Essential) Function in both automatic and semiautomatic role using the same blank firing attachment." (Ref item 7, app II)

2.4.2.5 "(Essential) Permit normal functioning of the weapon." (Ref item 8, app II)

2.4.3 Method

2.4.3.1 Firing was conducted in accordance with the schedule shown in Table 2-1. After each 100-round firing sequence the barrel was cooled to the point that it could be held by the bare hand.

TABLE 2-1

AMMUNITION EXPENDITURE BY WEAPON

	Weapon (M16A1) Number									
	1	2	3	4	5	6	7	8	9	10
BFA	X	X	X	X	X	X	X	X	X	
Cartridge Blank (M200)	X	X	X	X	X	X	X	X	X	
Ball (M193)								X	X	X
No Rounds Blank (M200) Semi-auto	2500 each		1500 each					1500 each		
No Rounds Blank (M200) Automatic	2500 each		1500 each					1500 each		
No Rounds Ball (M193) Semi-auto								1000 each		2500
No Rounds Ball (M193) Automatic								1000 each		2500
SUB-TOTAL (M200)	10,000		15,000					6,000		
SUB-TOTAL (M193)								4,000		5,000
TOTAL (M200)	31,000 *									
TOTAL (M193)	9,000									

* 4220 rounds expended in Subtests No 3 and 6.

2.4.3.2 Malfunctions occurring in firing subtests were recorded.

2.4.3.3 Causes of malfunctions, if identifiable, and corrective action were recorded.

2.4.3.4 Durability of the test item was noted and recorded during firing exercises and the Operational Suitability Subtest.

2.4.3.5 Gas tubes and carrier keys of rifles No 1 and No 2 were sectioned, inspected, and photographed.

2.4.4 Results

2.4.4.1 Malfunctions of the test blank firing system which occurred during this test are shown in Table 2-2.

TABLE 2-2

TEST BLANK FIRING SYSTEM MALFUNCTIONS

M16A1	Total M200 Rds Fired	Type and Number of Malfunctions							Total	Rate
		FF	FJ	FX	FFR	FBR	DF	Stub		
1	5,000	12	23	0	0	94	10	46	185	.037
2 *	(5,000)	(36)	(42)	(0)	(0)	(105)	(0)	(116)	(299)	(.060)
3	3,000	6	6	0	1	17	0	27	57	.019
4	3,000	6	6	0	1	25	1	13	52	.017
5	3,000	8	2	0	0	47	2	21	80	.026
6	3,000	8	0	0	0	33	0	23	64	.021
7	3,000	8	2	0	0	52	0	24	86	.028
8	3,000	8	3	0	0	23	7	31	72	.024
9	3,000	14	3	0	0	52	1	18	88	.029
TOTAL	26,000	70	45	0	2	343	21	203	684	.026

LEGEND:
FF - Failure to feed
FJ - Failure to eject
FX - Failure to extract
FFR - Failure to fire
FBR - Failure of the bolt to lock to the rear on the last round
DF - Double fire in semiautomatic mode
Stub - Failure of the blank round to feed properly due to the shortness of the cartridge, defective magazine, or accumulation of dirt around the bolt. The cartridge caught on the lip of the magazine or outer edge of the chamber.

* After 4200 rounds were fired the lower receiver group was replaced in an attempt to reduce stubbings. One-hundred-and-four stubbings occurred up to this point. After the part-change, 12 stubbings occurred in the remaining 800 rounds. Rifle No 2 data not included in totals. Data considered as not being representative due to statistically significant higher rates (99% confidence level).

2.4.4.2 Malfunctions of M16A1 rifles which fired M193 ball ammunition during the duration of the test are shown in Table 2-3.

TABLE 2-3

M193 BALL AMMUNITION FIRING MALFUNCTIONS

M16A1	Total M193 Rds Fired	Type and Number of Malfunctions		Total
		FF	Stub	
8	2,000	0	1	1
9	2,000	4	0	4
10	5,000	3	1	4
TOTAL	9,000	7	2	9

LEGEND: FF - Failure to feed
Stub - Failure of the cartridge to feed due to defective magazine or accumulation of dirt around the bolt. Cartridge caught on lip of magazine or outer edge of chamber.

2.4.4.3 Detailed system-by-system malfunction data obtained are included in Appendix I.

2.4.4.4 After 5000 rounds were fired through M16A1 rifles No 1 and 2, the two BFA's were serviceable.

2.4.4.5 The gas tubes and carrier keys of the test blank firing systems did not clog.

2.4.4.6 The nine test blank firing systems functioned in both semiautomatic and automatic modes.

2.4.4.7 Eight of the nine M16A1 rifles, using the test blank firing system, functioned normally, consistent with the malfunctions listed in Table 2-2. Rifle No 2 experienced 116 stubbing malfunctions. The lower receiver group was replaced on the weapon after 4200 rounds had been fired in an attempt to reduce the number of stubbings. Twelve stubbings occurred in the remaining 800 rounds of firing after the lower receiver group was changed. The rifle that fired ball ammunition exclusively functioned normally.

2.4.5 Analysis

2.4.5.1 In determining whether the test blank firing system is equal to or better than the BFA of the M14 rifle (with M82 blank cartridge), a comparison of malfunction rates of the M14 rifle, with BFA and M82 blank cartridge, from the service test of the BFA, XM15 (June 1968), and that of this check test was made. The BFA of the M14 rifle (with M82 blank cartridge) had a malfunction rate of 19 per thousand rounds fired.

2.4.5.2 A detailed analysis of the data contained in Table 2-2 shows that the malfunction rate demonstrated by rifle No 2 (60 per thousand rounds fired) was significantly above the norm exhibited by the other rifles. It was considered that this rifle was not representative as evidenced by its inconsistency with the performance of the other weapons. Due to statistically significant differences in the malfunction rates of rifle No 2 (99 percent confidence level), as opposed to the other rifles, the rates of rifle No 2 were not considered in the analysis. The total malfunction rate of the test blank firing system was 26 per thousand rounds fired. (See Table 2-2 in paragraph 2.4.4.1 for details.) The malfunction rate of the test blank firing system was greater than that of the BFA of the M14 rifle (with M82 blank cartridge); however, further analysis is required due to the difference in ammunition configuration and rifle characteristics.

2.4.5.3 The "stubbing" malfunction is inherent in the M200 blank cartridge and M16A1 rifle system because the blank cartridge is shorter than the ball cartridge. The user (ref 6, app IV) considers a 3-percent "stubbing" rate as acceptable, rather than state a requirement for a special magazine to be used with blank ammunition. The 203 "stubbings" which occurred in this check test represent a .8 percent "stubbing" rate, or eight per thousand rounds, of the 26,000 M200 blank rounds fired. Since the "stubbings" are within the user limits, it is the judgment of this Board that these malfunctions should not be considered in the comparison of the two BFA systems. Deduction of the "stubbing" malfunctions reduces the total rate (.026), as shown in Table 2-2, for the test blank firing system to .018 percent or 18 malfunctions per thousand rounds fired. This rate of 18 per thousand of the test blank firing system is better than the malfunction rate demonstrated by the M14 blank firing system during the XM15 service test and meets the criteria concerning reliability.

2.4.5.4 The other most frequent malfunction which occurred during testing was the failure of the bolt to lock to the rear (343 malfunctions). The failure of the bolt to lock to the rear is of less consequence in training than it would be in a combat environment. This malfunction occurs only after the last round has been fired from the magazine. In training, this situation has no impact other than a slight delay in chambering the first round of the subsequent magazine. This malfunction did not occur during the firing of the M14 rifle, with BFA and M82 blank cartridge, in the previous service test of the XM15 BFA. This Board was not able to determine the cause of this malfunction. It is possible that this particular lot of M200 blank ammunition has less propellant than that used in previous versions of XM200 ammunition; and that this and other characteristics of the BFA and weapon caused the frequency of this malfunction. In any event, this possibility should be investigated by the appropriate activity.

2.4.5.5 The analysis of the malfunctions sustained (Table 2-2) and on-site observations during testing revealed that the BFA serves its intended purpose and that the operational problems of the blank firing system are caused by the ammunition.

2.4.5.6 The Blank Firing Attachment, XM15E1, withstood 5000 rounds of firing on rifles No 1 and 2 and 3000 rounds of firing on each of 7 other rifles. The XM15E1 BFA is considered to be sufficiently durable.

2.4.5.7 Visual analysis of two gas tubes and carrier keys of rifles No 1 and 2, which fired 5000 rounds of M200 blank cartridges each, revealed that the test blank firing system did not clog.

2.4.5.8 The test blank firing system meets the criteria for automatic and semiautomatic operation of the M16A1 rifle.

2.4.5.9 The test blank firing system meets the criteria concerning normal functioning of the weapon, consistent with the malfunctions stated in the results. Although within accepted limits the short length of the M200 blank cartridge which causes "stubbings", as previously reported in the service test, remains a shortcoming.

2.4.5.10 The test blank firing system is considered to be sufficiently reliable and durable.

2.5 SUBTEST NO 5, MAINTENANCE

2.5.1 Objectives

2.5.1.1 To determine whether the deficiency of clogged carrier keys and gas tubes had been corrected.

2.5.1.2 To determine whether any difference in maintenance exists between firing blank ammunition as opposed to firing ball ammunition.

2.5.2 Criteria

2.5.2.1 "(Essential) Easily cleaned." (Ref item 9, app II)

2.5.2.2 "(Essential) Cause no undue wear on parts of this weapon." (Ref item 10, app II)

2.5.2.3 "(Essential) The test item with M200 Blank Ammunition will not cause clogging of the carrier key and the gas tube of the M16A1 rifle." (Ref item 17, app II)

2.5.2.4 "(Essential) The test item, with M200 Blank Ammunition, will not cause adverse effects upon the cleaning and maintenance of the M16A1 rifle." (Ref item 19, app II)

2.5.3 Method

2.5.3.1 Maintenance was performed in accordance with TM 9-1005-249-12, and other publications provided, at the time interval shown in Table 2-4.

2.5.3.2 Six of the 10 weapons were cleaned after each day of firing.

2.5.3.3 Four of the 10 weapons were cleaned after every 3 days of firing. This maintenance interval represents training situations in which the soldier might not be able to clean his individual weapon every day.

2.5.3.4 Throughout all testing, data pertaining to maintenance of weapons were recorded. An inspection of all weapons and test items was conducted prior to and after each cleaning and each firing exercise.

2.5.3.5 Gas tubes of rifles No 1 and 2 were cross-sectioned, inspected, and photographed.

TABLE 2-4

M16A1 MAINTENANCE SCHEDULE

Number and Type of Rounds Fired and Maintenance Interval												
Weapon Number												
1	2	3	4	5	6	7	8	9	10			
5000 rounds each, Blank (M200)		3000 rounds each, Blank (M200)		3000 rounds each, Blank (M200)		3000 rounds each, Blank (M200)	3000 rounds each, Blank (M200) and 2000 rounds each, Ball (M193)		5000 rounds Ball (M193)			
One cleaned each day	One cleaned every 3 days	Cleaned each day		One cleaned each day	One cleaned every 3 days	Cleaned every 3 days	One cleaned each day	One cleaned every 3 days	Cleaned each day			

2.5.4 Results

2.5.4.1 The 10 test soldiers experienced no difficulty in cleaning the test item.

2.5.4.2 No undue wear of parts of the weapons was experienced.

2.5.4.3 No maintenance difficulties were experienced concerning the seven M16A1 rifles that fired blank ammunition as opposed to the two M16A1 rifles that fired blank and ball ammunition.

2.5.4.4 No maintenance difficulties were experienced concerning the rifles described in paragraph 2.5.4.3 as opposed to the one rifle that fired ball ammunition.

2.5.4.5 The record of malfunctions is recorded in Subtest No 4.

2.5.4.6 All nine M16A1 rifles through which the M200 blank cartridges were fired functioned throughout the duration of the test. Clogging of the gas tubes and carrier keys was not experienced (see fig 9 and 10, app I). A relatively even coating of the internal surfaces, by firing residue, of the gas tubes and carrier keys of rifles No 1 and 2 was noted.

2.5.4.7 There was no appreciable difference found in the malfunction rates or time necessary to clean the rifles which received 3-day scheduled maintenance as opposed to the rifles that received daily maintenance.

2.5.5 Analysis

The deficiency of clogged carrier keys and gas tubes experienced in the previous service test has been corrected. No difference exists in maintenance, ease of cleaning, or wear on weapons parts of those weapons firing blank ammunition as opposed to the weapons firing ball ammunition.

2.6 SUBTEST NO 6, OPERATIONAL SUITABILITY

2.6.1 Objective

To determine the operational suitability of the test item under field conditions.

2.6.2 Criterion

"(Essential) The test item with Cartridge, Blank, M200, will provide a suitable training device for the M16A1 rifle for use in tactical training." (Ref item 16, app II)

2.6.3 Method

2.6.3.1 An Infantry fire team equipped with a fighting load conducted a tactical exercise over the USAIB Attack Course. After crossing a line of departure a fire team leader maneuvered his fire team in the attack to seize a portion of a platoon objective. Enroute to the objective,

the fire team was taken under fire by local security forces. The fire team employed fire and movement against these security forces. Following this engagement the fire team employed fire and movement up to the defensive wire, passed through the defensive wire, and conducted the final assault of the objective.

2.6.3.2 Artillery and automatic weapons simulators were employed on the attack course to portray tactical realism.

2.6.3.3 The Infantry fire team fired a basic load of 140 rounds per rifleman in mixed semiautomatic and automatic modes during the attack.

2.6.3.4 A day and night reconnaissance patrol and ambush exercise were conducted by nine test soldiers. Each rifleman fired a basic load of 140 rounds in the semiautomatic and automatic modes during the day exercise and also at night.

2.6.3.5 During the conduct of the above tactical exercises the BFA and rifles were exposed to sand, dirt, and moisture.

2.6.3.6 Control personnel recorded all malfunctions occurring during the tactical exercises.

2.6.3.7 Comments of individual riflemen pertaining to the operational suitability of the test item during the tactical exercise were recorded by test control personnel.

2.6.3.8 The test item was examined by experienced parachutists to determine a method of delivery.

2.6.4 Results

2.6.4.1 Malfunctions which occurred during the tactical exercises are recorded in Subtest No 4.

2.6.4.2 No evidence of breakage or damage of the BFA was experienced during the tactical exercises.

2.6.4.3 No adverse effects on the operation of the test blank firing system were experienced after the nine BFA's had been subjected to sand and dirt. Moisture (fog and light rain) which occurred during reliability and durability firing did not cause any adverse effect on the operation of the test blank firing system.

2.6.4.4 The nine BFA's did not become entangled in vegetation during the tactical exercises.

2.6.4.5 No difficulties were experienced in firing semiautomatic and automatic modes of fire.

2.6.4.6 During the day and night reconnaissance patrol and ambush exercise the nine soldiers engaged by fire their respective aggressor force. The sound and flash of the test blank firing systems were sufficiently realistic to allow the individual rifleman to pinpoint and engage his target.

2.6.4.7 During the day attack exercise the test blank firing system provided sufficient realism during the attack of a prepared defensive position by the fire team.

2.6.4.8 The BFA could be carried within the loaded magazine pouch of an individual parachutist.

2.6.5 Analysis

The test blank firing system provides a realistic training device for use in tactical training.

2.7 SUBTEST NO 7, HUMAN FACTORS

2.7.1 Objective

To determine the suitability of the test item from the human factors standpoint.

2.7.2 Criterion

"(Desirable) The test item will exhibit no unfavorable characteristics pertaining to human factors." (Ref item 20, app II)

2.7.3 Method

2.7.3.1 Throughout all subtests, data reflecting on human factors were recorded.

2.7.3.2 Specific attention was given to the following:

a. Ease of attachment of the test item to and removal from the weapon.

b. Tools required to attach the test item to the weapon or detach the test item from the weapon.

c. Sharp projections or surfaces on the test item which cause injury to the individual rifleman or cause entanglement in vegetation.

2.7.4 Results

2.7.4.1 The test item was easy to attach to or remove from the M16A1 rifle.

2.7.4.2 No tools were required to attach the test item to or remove it from the M16A1 rifle.

2.7.4.3 No injuries were experienced by the nine test soldiers during the test.

2.7.5 Analysis

The test item is suitable from a human factors standpoint.

2.8 SUBTEST NO 8, VALUE ENGINEERING

2.8.1 Objective

To determine whether there were any unnecessary, costly, or nice-to-have features.

2.8.2 Criterion

"(Essential) The test item will be of simple design and have no unnecessary, costly, or nice-to-have features." (Ref item 11, app II)

2.8.3 Method

Throughout all testing, special attention was given to detect any unnecessary, costly, or nice-to-have features which may be modified or deleted without compromising the effectiveness of the test item.

2.8.4 Results

The test item had no unnecessary, costly, or nice-to-have features.

2.8.5 Analysis

The test item is suitable from a value engineering standpoint.

SECTION 3. APPENDICES

APPENDIX I. TEST DATA

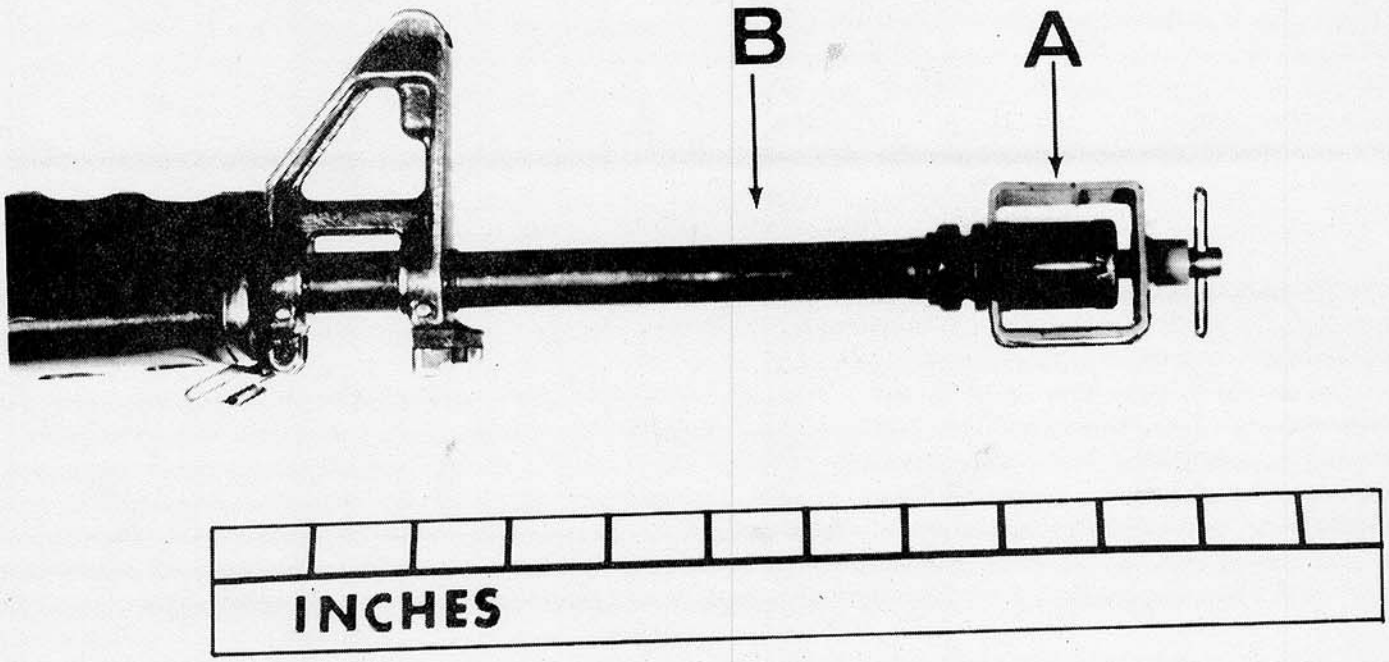

Figure 1

Test item (A) attached to M16A1 rifle barrel (B).

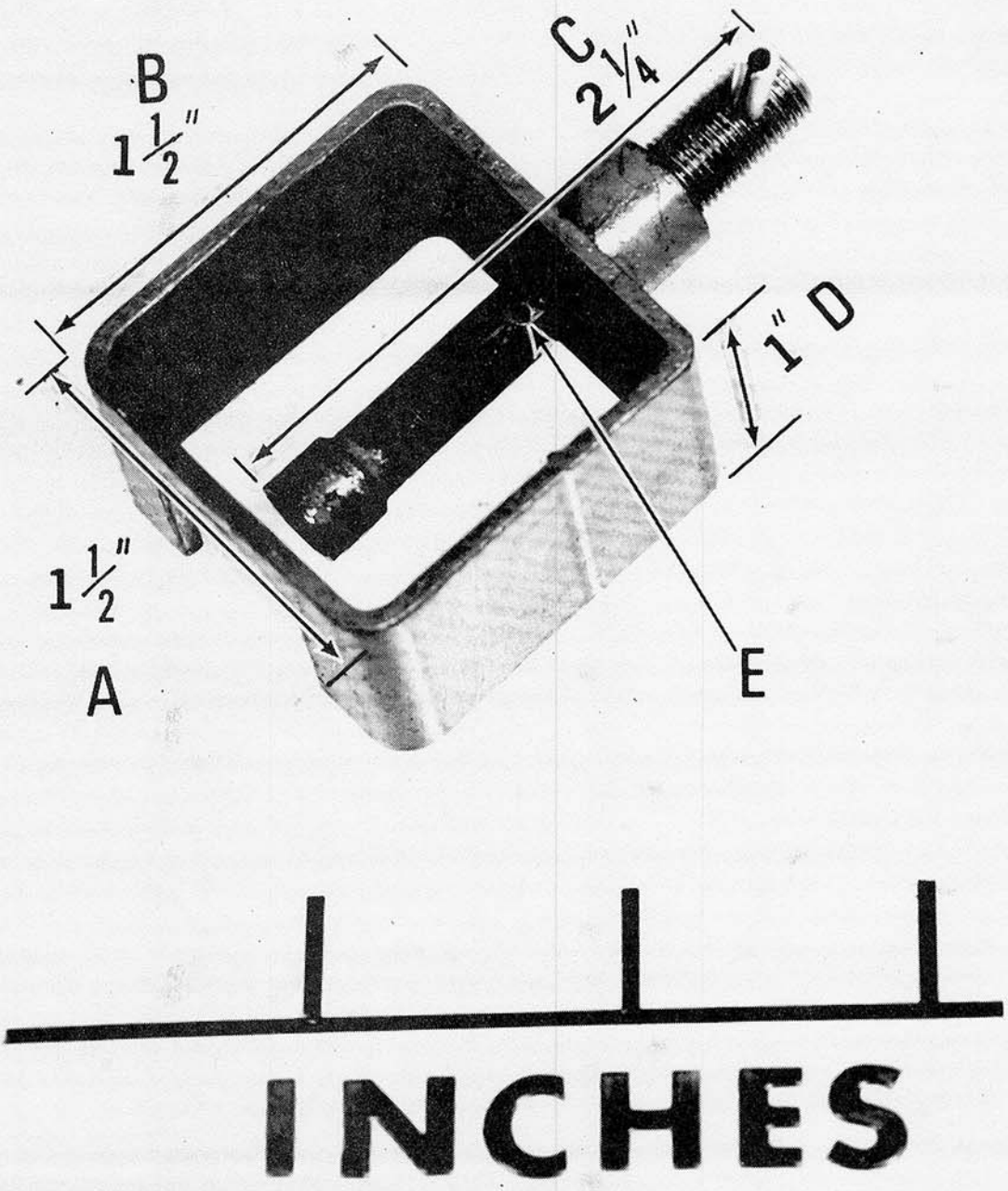

Figure 2

Size of the test item; length (A), height (B), length of restrictor tube (C), width (D). Orifice shown at (E).

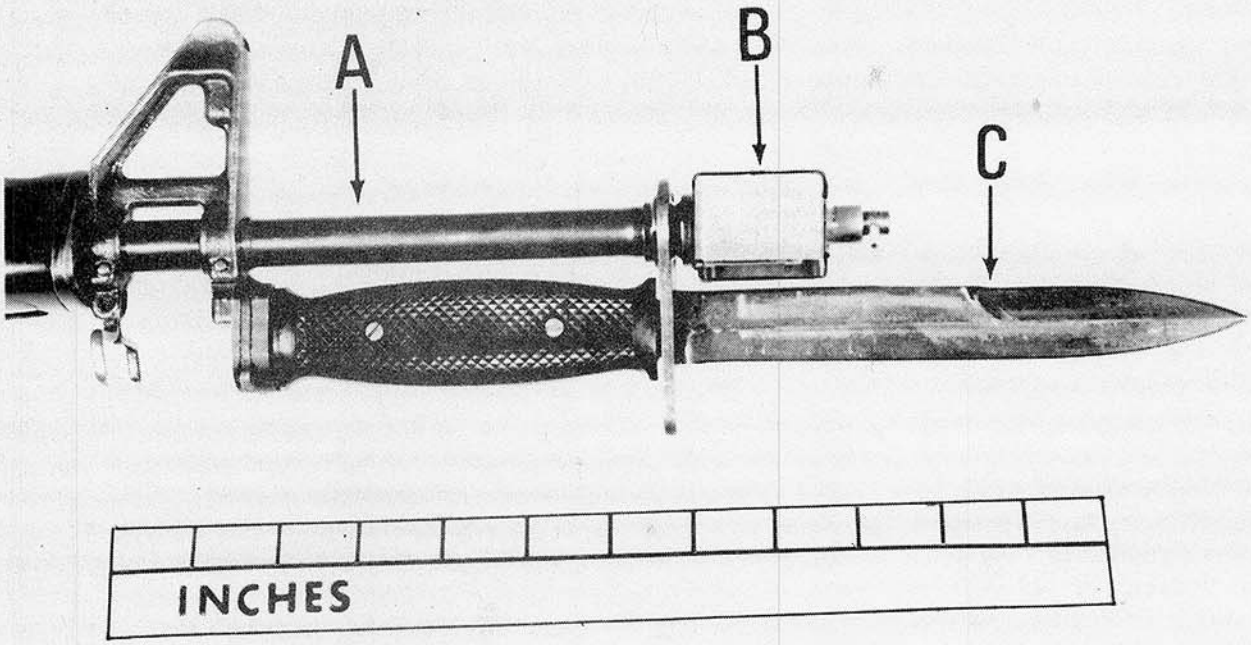

Figure 3

Test item (B) and bayonet (C), attached to the M16A1 rifle (A).

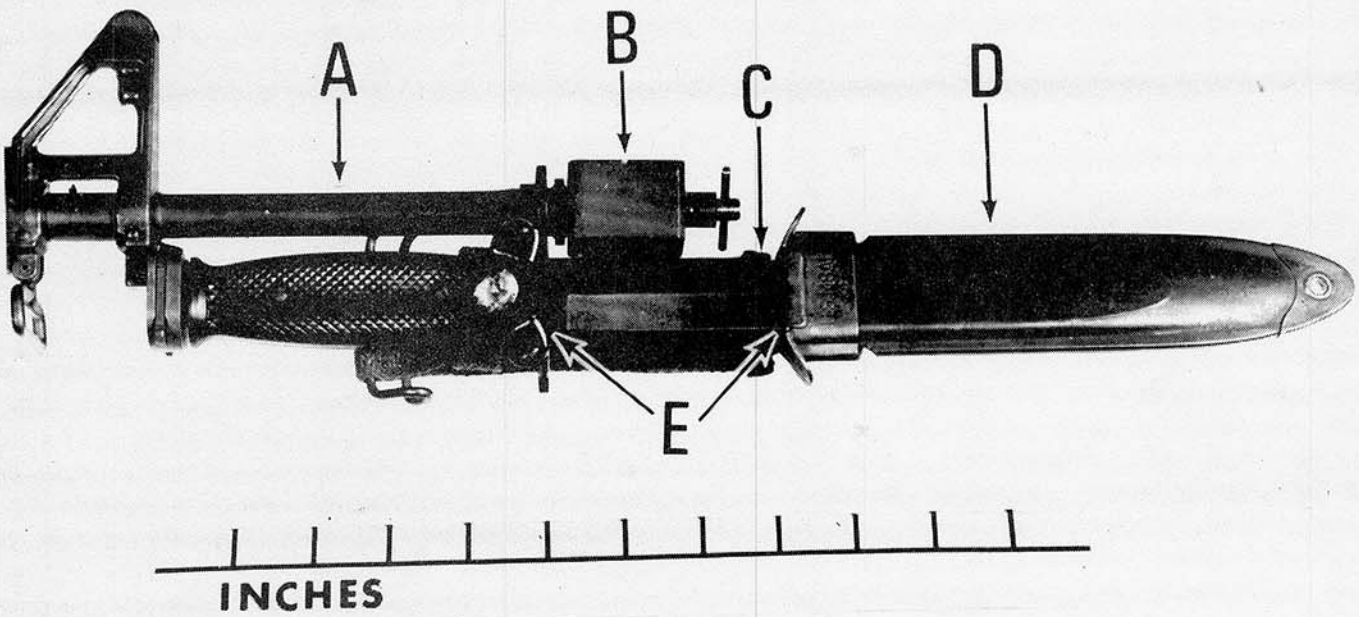

Figure 4

Scabbard (D) secured to the bayonet (C), with test item (B) attached to the M16A1 rifle (A). (E) shows exposed blade.

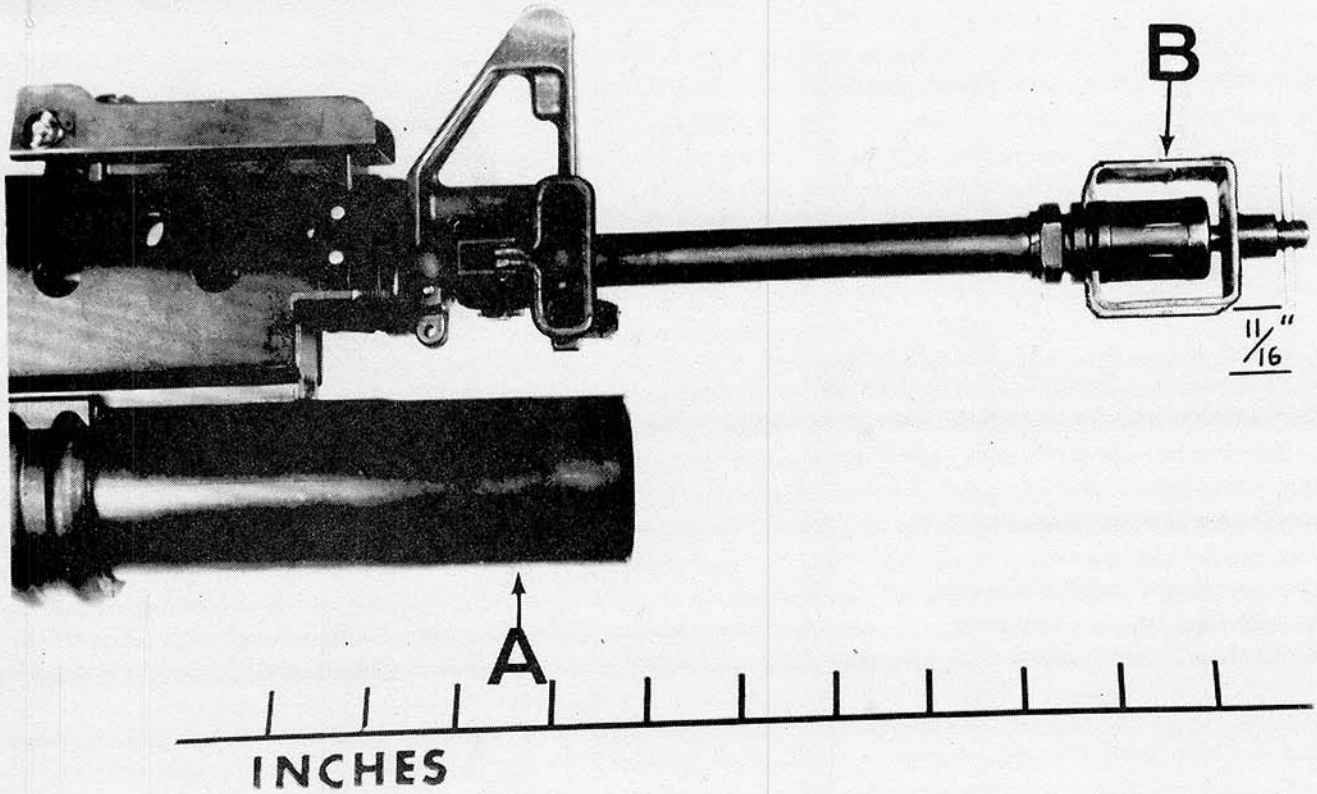

Figure 5

Muzzle clearance (11/16-inch) of M203 grenade launcher (A) and lowest portion of test item (B).

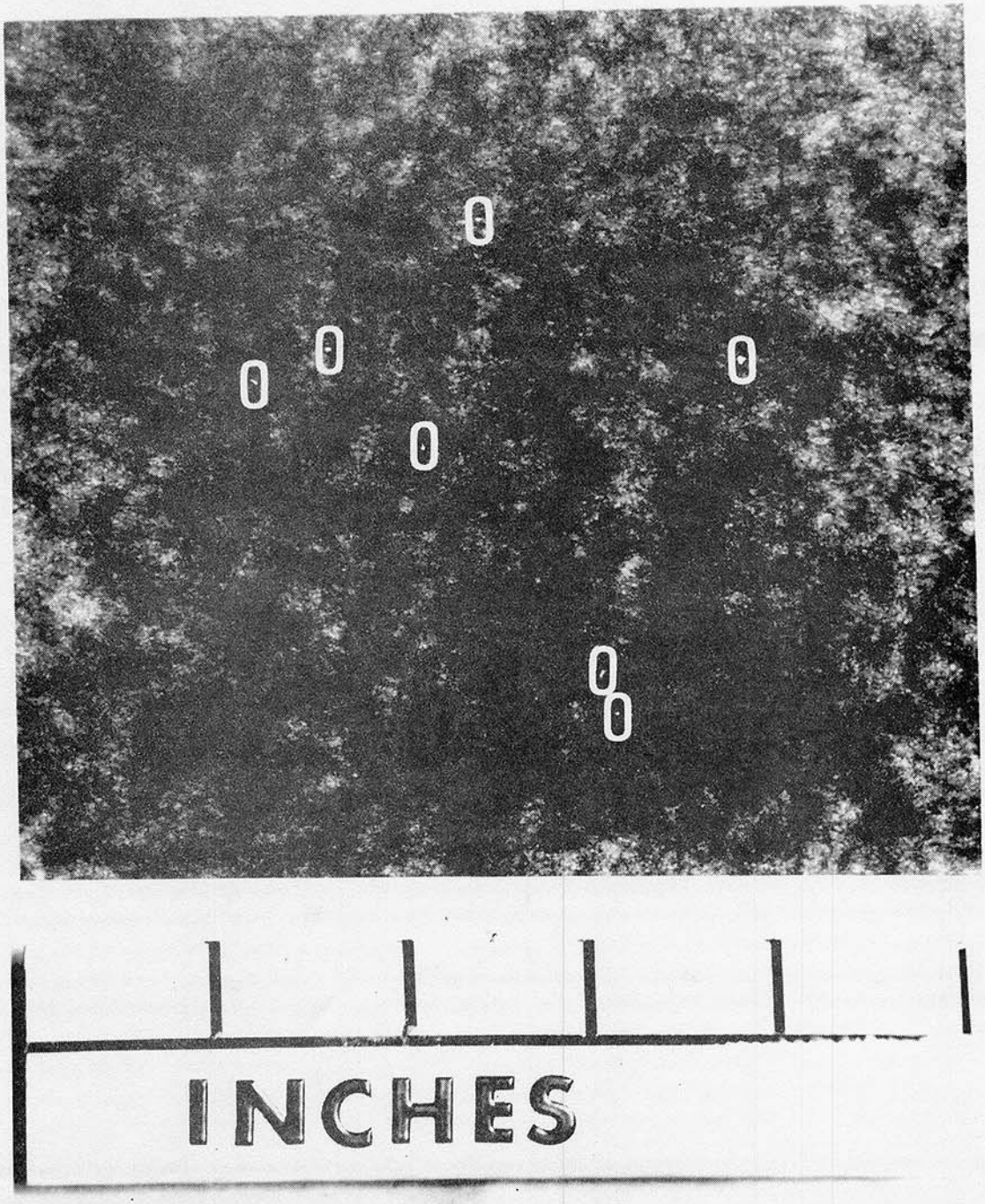

Figure 6

Perforations in paper (circles), 12 inches from test item, caused by blank cartridge residue. (Small size of perforations at 24 inches prevented detection by photography.)

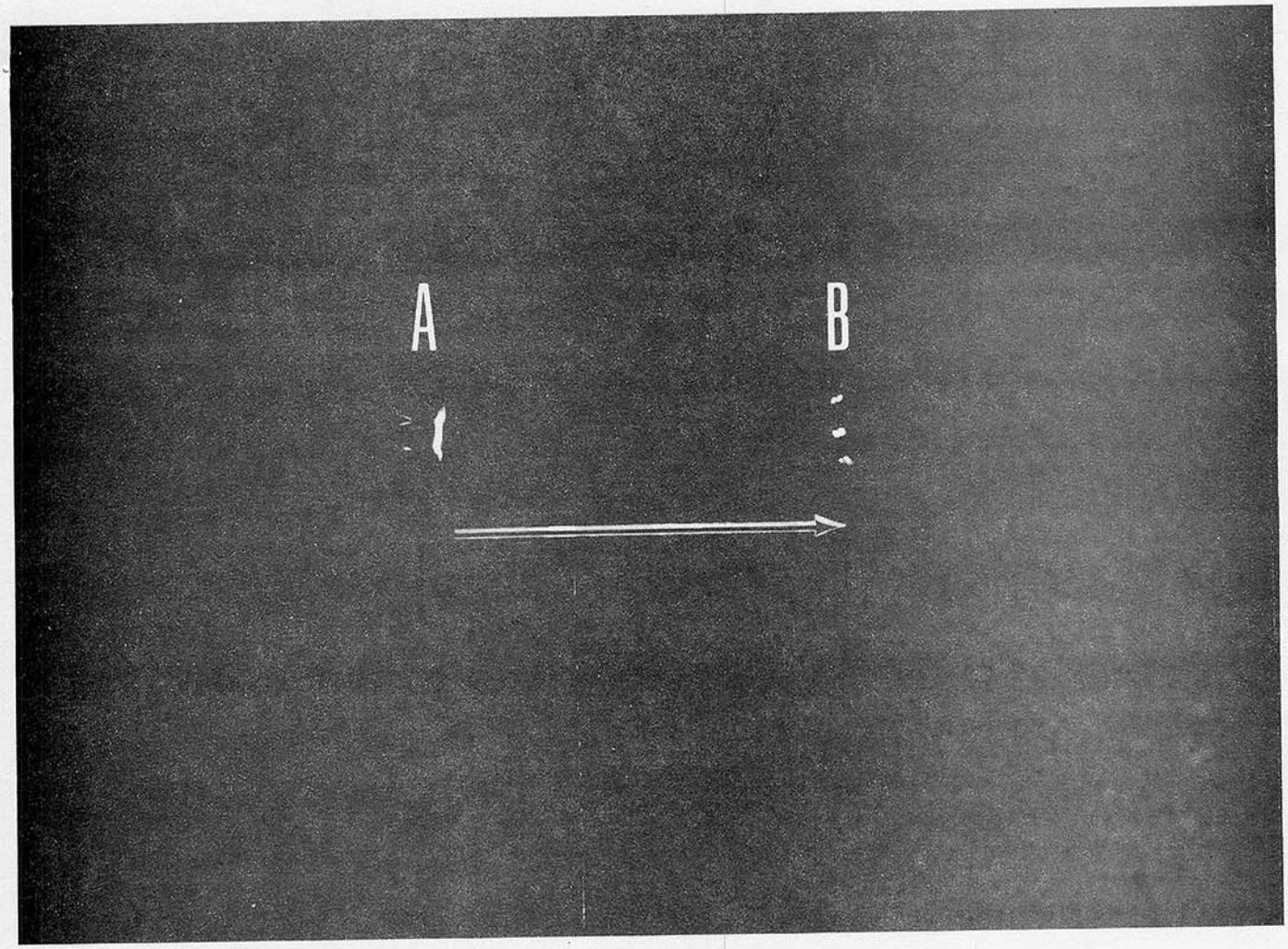

Figure 7

Comparison of flash (side view) of test blank firing system (A) and M16A1 rifle firing ball ammunition (B). Arrow shows direction of fire.

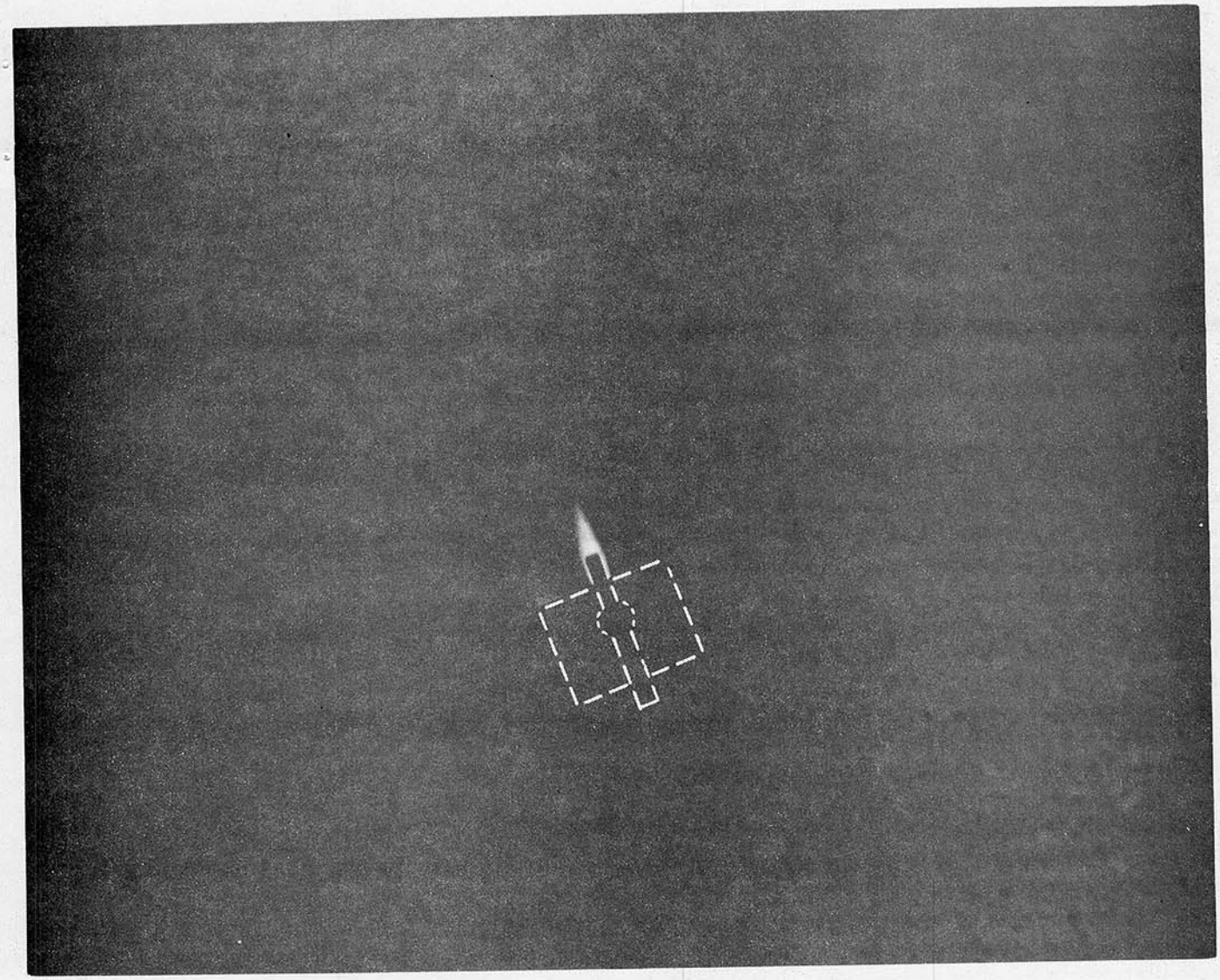

Figure 8

Flash of test blank firing system (front view). (Flash spurting from the orifice.)

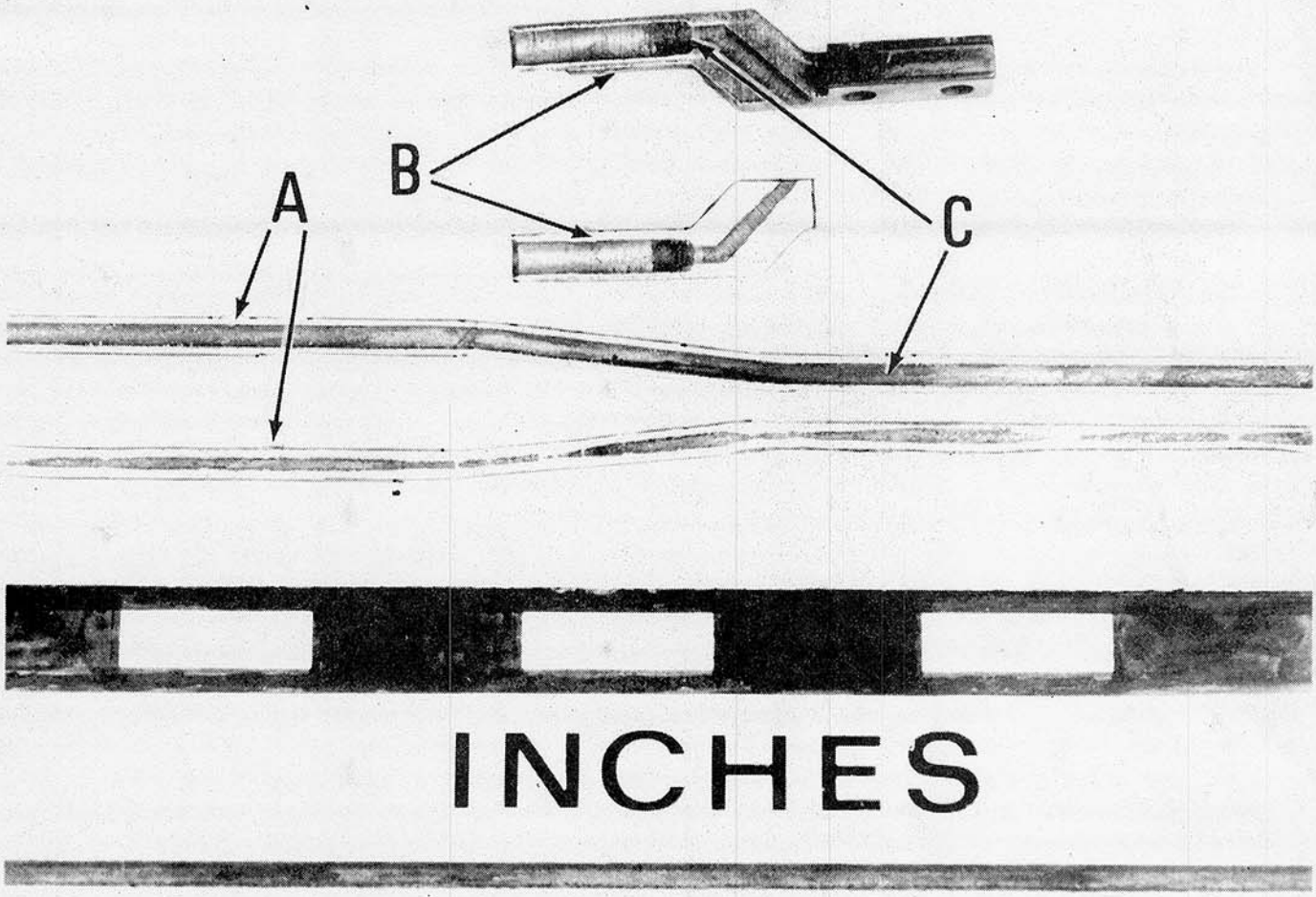

Figure 9

Sectioned gas tube (A) and carrier key (B) of M16A1 rifle No 1 with resultant firing residue (C).

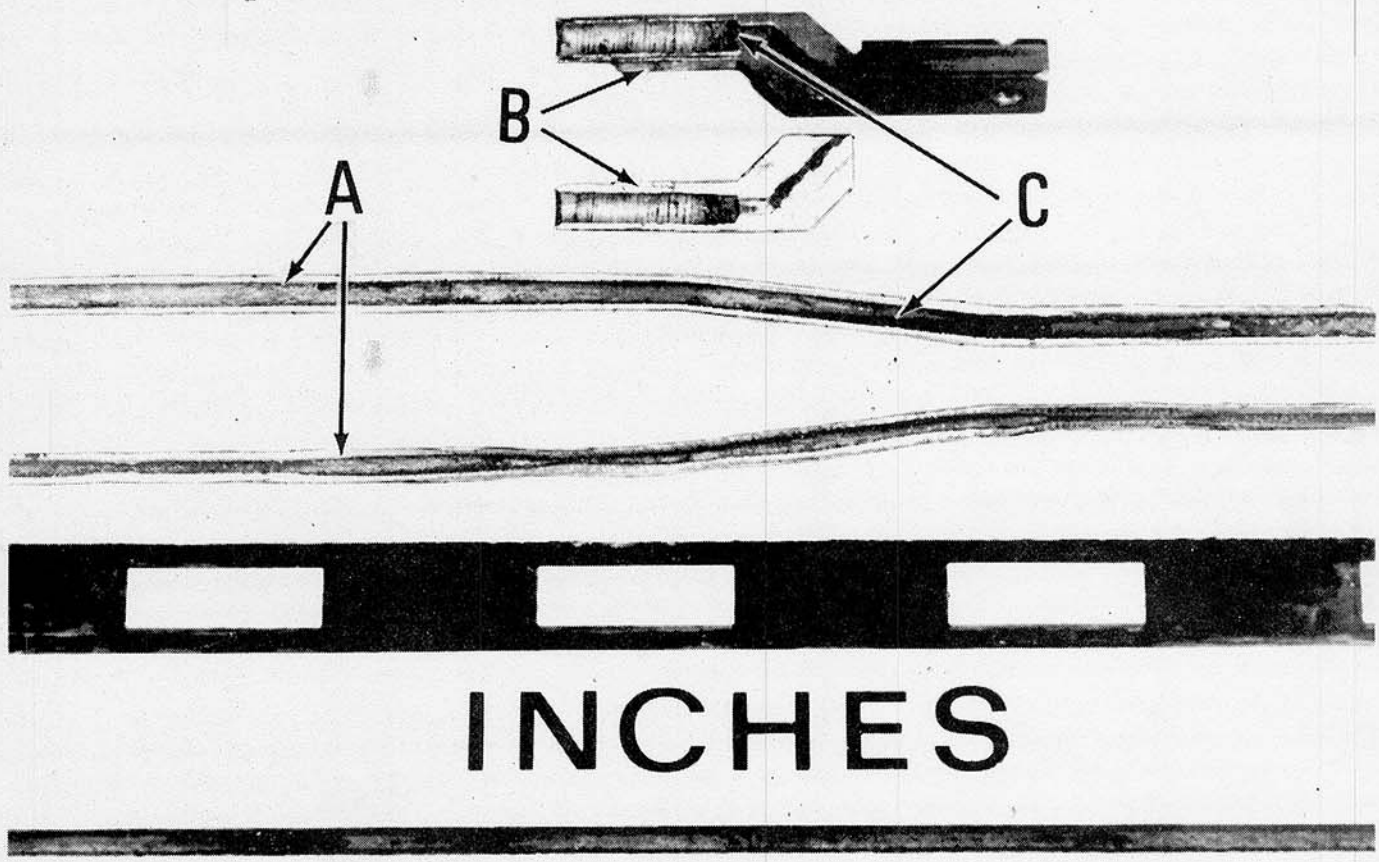

Figure 10

Sectioned gas tube (A) and carrier key (B) of M16A1 rifle No 2 with resultant firing residue (C).

Chart 3-1

MALFUNCTIONS

M16A1 No 1, SN 2125266, Fired with BFA No 1

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	3		1					2	2	2		1	1	12
FJ	1	1		1	1	3	5			1	5	3	2	23
FX														
FBR	7	10	10	10	4	8	8	2	7	9	8	6	5	94
FFR														
DF						1		1			6		2	10
Stub	1	7	2	3	4	5	2	5	4	1	6	3	3	46
TOTAL	12	18	13	14	9	17	15	10	13	13	25	13	13	185

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-2

MALFUNCTIONS

M16A1 No 2, SN 2125864, Fired with BFA No 2

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	1	2	1	2		1	7	7	1	3	4	6	1	36
FJ				1	1	2		1	2	4	9	8	14	42
FX														
FBR	4	10	10	9	9	4	2	8	3	10	12	18	6	105
FFR														
DF														
Stub	2	3	2	4	1	9	24	16	18	13	12	5	7	116
TOTAL	7	15	13	16	11	16	33	32	24	30	37	37	28	299

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

NOTE: Lower receiver group changed at round number 4200.

Chart 3-3

MALFUNCTIONS

M16A1 No 3 , SN 2114132, Fired with BFA No 3

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	1		1	1	1		1	1						6
FJ		1	2		2			1						6
FX														
FBR	1	5	5	3	1		2							17
FFR					1									1
DF														
Stub	2	1	11	2	5	3	3							27
TOTAL	4	7	19	6	10	3	6	2						57

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-4

MALFUNCTIONS

M16A1 No 4, SN 2124138, Fired with BFA No 4

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF					2		4							6
FJ				1	2	3								6
FX														
FBR	3	5	7	4	4	2								25
FFR	1													1
DF	1													1
Stub		3	2	3		1	1	3						13
TOTAL	5	8	9	8	8	6	5	3						52

Legend:

FF - Failure to Feed

FJ - Failure to Eject

FX - Failure to Extract

FBR - Failure of the Bolt to Lock to the Rear on the Last Round

FFR - Failure to Fire

DF - Double Fire, Semiautomatic Mode

Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.

R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-5

MALFUNCTIONS

M16A1 No 5, SN 2112763, Fired with BFA No 5

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	2	1	2		1		2	1						9
FJ					1		1							2
FX														
FBR	10	6	9	5	6	1	6	3						46
FFR														
DF								2						2
Stub	1	5	0	4	5	4	1	1						21
TOTAL	13	12	11	9	13	5	10	7						80

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-6

MALFUNCTIONS

M16A1 No 6 , SN2124217 , Fired with BFA No 6

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	3		2	1	1			1						8
FJ														
FX														
FBR	9	8	2	2	6		4	2						33
FFR														
DF														
Stub	3	5	0	4	3	1	2	5						23
TOTAL	15	13	4	7	10	1	6	8						64

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-7

MALFUNCTIONS

M16A1 No 7, SN 2118391, Fired with BFA No 7

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF		1		1	2			4						8
FJ		1	1											2
FX														
FBR	1	11	11	7	5	8	8	1						52
FFR														
DF														
Stub	1	0	9	5	2	2	4	1						24
TOTAL	2	13	21	13	9	10	12	6						86

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-8

MALFUNCTIONS

M16A1 No 8__, SN 2114135, Fired with BFA No 8

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF				1	4		3							8
FJ					1			2						3
FX														
FBR	1		6	8	1		5	2						23
FFR														
DF							7							7
Stub	5	4	5	1	2	7	5	2						31
TOTAL	6	4	11	10	8	7	20	6						72

Legend:

FF - Failure to Feed

FJ - Failure to Eject

FX - Failure to Extract

FBR - Failure of the Bolt to Lock to the Rear on the Last Round

FFR - Failure to Fire

DF - Double Fire, Semiautomatic Mode

Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.

R≤400 - Number of rounds fired, less than or equal to 400 rounds

Chart 3-9

MALFUNCTIONS

M16A1 No 9__, SN 2125466, Fired with BFA No 9

Malfunction Type	R≤400	R≤800	R≤1200	R≤1600	R≤2000	R≤2400	R≤2800	R≤3200	R≤3600	R≤4000	R≤4400	R≤4800	R≤5000	Total
FF	1			1	1	5	3	3						14
FJ			2	1										3
FX														
FBR	3	11	5	13	2	5	10	3						52
FFR														
DF								1						1
Stub	1		2	1	1	3	4	6						18
TOTAL	5	11	9	16	4	13	17	13						88

Legend:

FF - Failure to Feed
FJ - Failure to Eject
FX - Failure to Extract
FBR - Failure of the Bolt to Lock to the Rear on the Last Round
FFR - Failure to Fire
DF - Double Fire, Semiautomatic Mode
Stub - Failure of the round to feed due to shortness of the cartridge, blunt face of the blank cartridge, defective magazine, or accumulation of dirt around the bolt. Cartridge catches on the lip of the magazine or outer edge of the chamber.
R≤400 - Number of rounds fired, less than or equal to 400 rounds

APPENDIX II. TEST FINDINGS

Item	Source	Requirements	Applicable Subtest	Remarks
1	USAIS Draft Characteristics, para 2D	(Essential) Weight of eight ounces or less.	2.1	Met. See Results, 2.1.4.3.
2	USAIS Draft Characteristics, para 2F	(Essential) Easily attached to and removed from the weapon without disassembly of the weapon	2.1	Met. See Results, 2.1.4.4.
3	USAIS Draft Characteristics, para 2K	(Essential) Permit use with bipod attached.	2.1	Met. See Results, 2.1.4.7.
4	USAIS Draft Characteristics, para 2E	(Essential) Conspicuous color (to provide constant recognition that the attachment is on the weapon, thus minimizing inadvertent firing of live ammunition with the BFA attached).	2.1 2.2	Met. See Results, 2.2.4.3.
5	USAIS Draft Characteristics, para 2G	(Essential) Must attach securely to the weapon to prevent propulsion down range should it be accidently loosened.	2.2	Met. See Results, 2.2.4.5.
6	USAIS Draft Characteristics, para 2B	(Essential) Durability and reliability (of the test item with M200 Blank Cartridge and M16A1 Rifle) equal to or greater than the BFA for the M14 rifle (with M82 Blank Cartridge).	2.4	Met. See Analysis, 2.4.5.
7	USAIS Draft Characteristics, para 2H	(Essential) Function in both automatic and semi-automatic role using the same blank firing attachment.	2.4	Met. See Results, 2.4.4.6.
8	USAIS Draft Characteristics, para 2I	(Essential) Permit normal functioning of the weapon.	2.4	Met. See Results, 2.4.4.7, and Analysis, 2.4.5.1.

Item	Source	Requirements	Applicable Subtest	Remarks
9	USAIS Draft Characteristics, para 2C	(Essential) Easily cleaned.	2.5	Met. See Results, 2.5.4.1.
10	USAIS Draft Characteristics, para 2J	(Essential) Cause no undue wear on parts of the weapon.	2.5	Met. See Results, 2.5.4.2.
11	USAIS Draft Characteristics, para 2A. USAIB	(Essential) The test item will be of simple design and have no unnecessary, costly, or "nice-to-have" features.	2.8	Met. See Results, 2.8.4.
12	USAIB	(Desirable) The bayonet can be attached to the M16A1 rifle fit with the BFA.	2.1	Met. See Results, 2.1.4.5.
13	USAIB	(Desirable) There will be adequate clearance between the M203 grenade launcher muzzle and the BFA.	2.1	Met. See Results, 2.1.4.6.
14	USAIB	(Essential) The test item will be designed to prevent injury to using personnel.	2.2	Met. See Analysis, 2.2.5.1.
15	USAIB	(Essential) The test item and M200 Blank Cartridge will simulate as near as possible the sound, smoke, and flash produced by the M193 cartridge with the M16A1 rifle.	2.3	Met. See Results, 2.3.4, and Analysis, 2.3.5.
16	USAIB	(Essential) The test item with Cartridge, Blank, M200, will provide a suitable training device for the M16A1 rifle for use in tactical training.	2.6	Met. See Results, 2.6.4.

Item	Source	Requirements	Applicable Subtest	Remarks
17	USAIB	(Essential) The test item with M200 Blank Ammunition will not cause clogging of the carrier key and the gas tube of the M16A1 rifle.	2.5	Met. See Results, 2.5.4.6.
18	USAIB	(Essential) The test blank firing system will be sufficiently reliable to withstand a minimum of 3000 rounds of blank ammunition firing without clogging of the rifle gas system.	2.5	Met. See Results, 2.5.4.6.
19	USAIB	(Essential) The test item, with M200 Blank ammunition will not cause adverse effects upon the cleaning and maintenance of the M16A1 rifle.	2.5	Met. See Results, 2.5.4.3 and 2.5.4.4.
20	USAIB	(Essential) The test item will exhibit no unfavorable characteristics pertaining to human factors.	2.7	Met. See Results, 2.7.4.
21	AMCPM-RS Letter, 15 Oct 70, para 4	(Essential) The test item will possess the durability to withstand 5000 rounds of firing.	2.4	Met. See Results, 2.4.4.4

APPENDIX III. DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

Deficiency	Suggested Corrective Action	Remarks
None		

2. SHORTCOMINGS

Shortcoming	Suggested Corrective Action	Remarks
2.1 The shorter length of the test cartridge contributed to the high incidence of stoppages wherein the test cartridge caught on the lip of the magazine or on the outer edge of the chamber.	None	Found in the previous service test.

3. CORRECTED DEFICIENCIES AND SHORTCOMINGS

Deficiency/Shortcoming	Corrective Action	Remarks
None		

4. PREVIOUS DEFICIENCIES

Deficiency Previous Test	Corrective Action	Remarks
None		

APPENDIX IV. REFERENCES

1. Message, AJIIS-P, USAIS, 12-707, 141400Z Dec 63, Draft Characteristics (Essential) of BFA for M16E1 Rifle.

2. USAIB Final Report of Service Test of Blank Firing Attachment, XM15, and Cartridge 5.56-mm, Blank, XM200, USATECOM Project No 8-4-0250-02, June 1968.

3. APG Final Report on Engineering Test of 5.56-mm Blank Cartridge, XM200, and Blank Firing Attachment XM15 for Rifle, 5.56-mm, M16 and M16E1, USATECOM Project No 8-4-0250-01, November 1968.

4. Pamphlet on Definitions and Identifications of Malfunctions for 5.56-mm Weapons, M16A1/XM177E2, USATECOM Project No 8-8-0070-05, November 1968.

5. Letter, AMSTE-BC, USATECOM, 4 December 1968, subject: Final Engineer and Service Test Reports for Blank Firing Attachment, XM15, and Cartridge, 5.56-mm, Blank, XM200, for M16A1 Rifle, USATECOM Project No 8-4-0250-01/02.

6. Letter, AMCPM-RS, USAMC, 31 Mar 70, subject: Blank Firing Attachment (BFA) for M16A1 Rifle, with 1 incl.

7. Letter, AMCPM-RS, USAMC, 15 October 1970, subject: Blank Firing Attachment (BFA) for M16A1 Rifle, with 1st Indorsement, 15 October 1970.

8. Letter, AMSTE-BC, USATECOM, 27 October 1970, subject: Test Directive for Check Test of Blank Firing Attachment (BFA) for M16A1 Rifle, USATECOM Project No 8-WE-620-015-001/002.

APPENDIX V. ABBREVIATIONS

1. BFA - Blank Firing Attachment
2. M16A1 - Rifle, 5.56-mm, M16A1
3. M193 - Cartridge, Ball, 5.56-mm, M193
4. M200 - Cartridge, Blank, 5.56-mm, M200
5. M203 - Launcher, Grenade, 40-mm, M203
6. PM-RS - Product Manager, Rifles
7. Rd - Round
8. Semi-auto - Semiautomatic
9. TM - Technical Manual
10. USAIB - United States Army Infantry Board
11. USAIS - United States Army Infantry School
12. USATECOM - United States Army Test and Evaluation Command
13. USAWECOM - United States Army Weapons Command
14. XM15 - Blank Firing Attachment, XM15
15. XM15E1 - Blank Firing Attachment, XM15E1

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13. ABSTRACT

The Check Test of the Blank Firing Attachment (BFA), XM15E1, was conducted by the US Army Infantry Board from 1 December 1970 to 4 January 1971 at Fort Benning, Georgia. The purpose of the test was to determine whether the deficiency and shortcoming found during the service test had been corrected and to determine whether the XM15E1 BFA with M200 blank cartridge was suitable for US Army use. Specific phases of testing under existing ambient conditions included preoperational inspection and physical characteristics, safety, adequacy of simulation, reliability and durability, maintenance, operational suitability, human factors, and value engineering. Nine BFA's and 31,000 rounds of M200 blank cartridges were used in the conduct of the test. No deficiencies were found. The previous deficiency, excessive build-up of firing residue in the bolt carrier key and gas tube of the M16A1 rifle, found in the XM15 service test, had been corrected. The previously reported shortcoming concerning the high incidence of stoppages due to the short length of the M200 blank cartridge continued to exist (.008); however, the percentage of occurrence was within the limits specified by the user (.03). The malfunction rate exhibited by one of the nine M16A1 rifles (rifle No 2, .060) was deducted from the final analysis because it was abnormal as compared to the other rifles. The eight remaining test blank firing systems had a total malfunction rate of .026 as compared to that of the BFA for the M14 rifle (.019, Service Test of the XM15 BFA, June 1968). In arriving at the chargeable malfunction rate, the "stubbing" rate of the eight rifles was deducted (.008). This gave a malfunction rate of .018, which was comparable to that of the M14 rifle. The XM15E1 BFA was considered durable and reliable. It was concluded that the Blank Firing Attachment, XM15E1, with M200 blank cartridge, was suitable for US Army use.

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Blank Firing Attachment BFA XM15E1 M200 Blank Cartridge						

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